

CPU Shootout: Pentium 4 EE vs. Athlon 64 FX-53!

MAXIMUM PC

MINIMUM BS • MAY 2004

3D Gaming SPECIAL

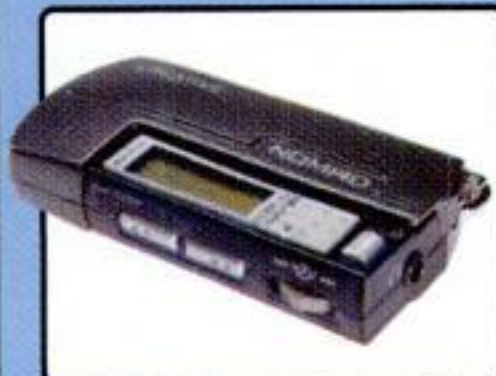
Exclusive! We preview nVidia's revolutionary new GeForce 6800!

ALSO INSIDE

- 10** best-looking games of 2004
 - + 3** flat-panels that don't suck
 - + 1** top-secret ATI update
-
- = 1 UNBELIEVABLE ISSUE!**



LAB-TESTED



Creative's MuVo TX mini MP3 player



Western Digital 250GB Media Center



HP's Scanjet 4670

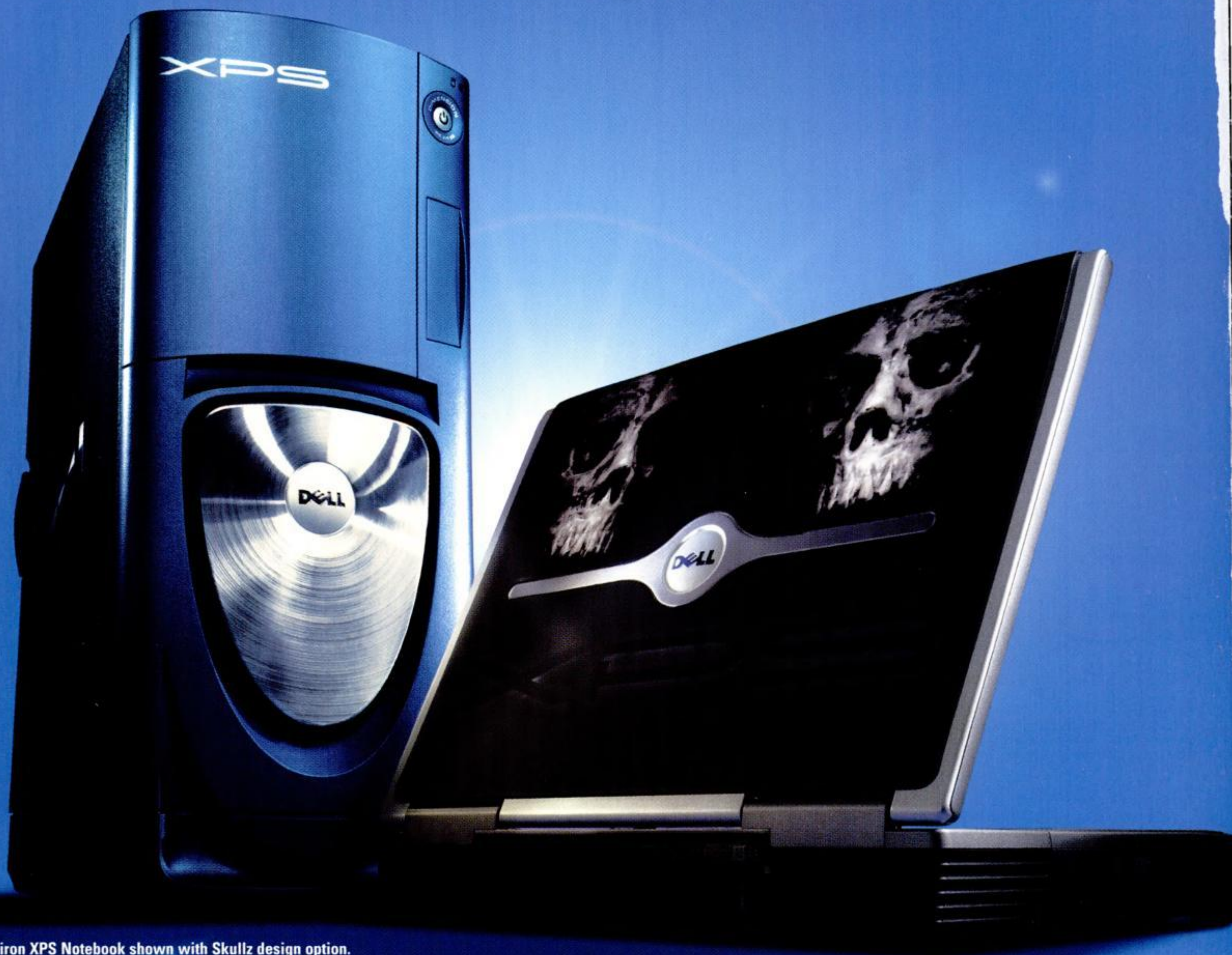


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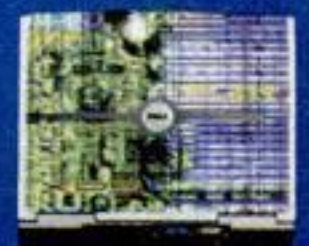
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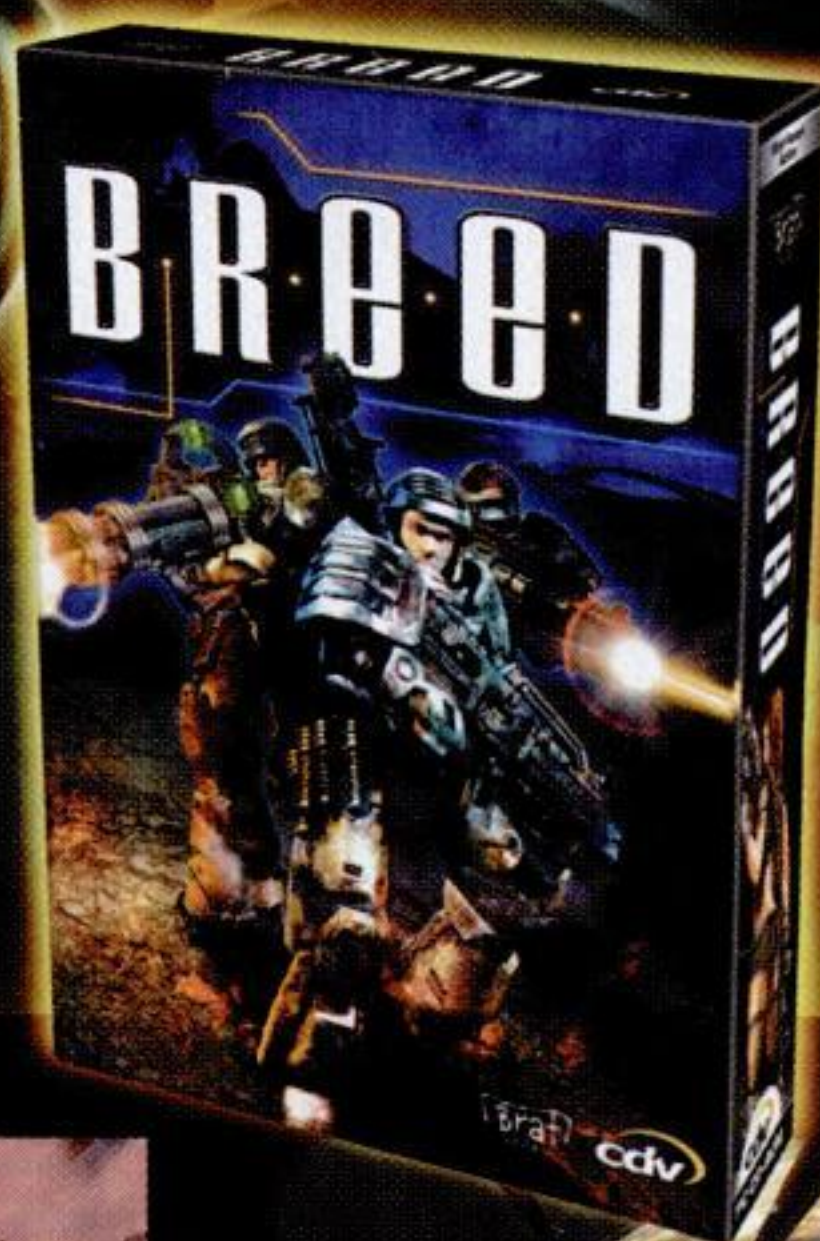
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Release Notes

Human Needs, Technological Evolution

I was a fresh-faced young editor when a company named Rendition treated the magazine I worked for to an early look at an "exciting new technology."

The company's representative dazzled the assembled crowd with a single, simple demonstration. He turned on the PC and opened an image of a floating sphere, which he proceeded to spin, twist, move, and bounce off the sides of the screen in real time. After the demo, three words were uttered: "Oh. My. God." Indeed, the first shot in the 3D revolution had been fired.

Looking back, this rapid burst of technological evolution seems inevitable; we want our information and entertainment sources to be as visually rich and "realistic" as possible. This notion—that technology will inevitably respond to human needs—got me wondering about the future. What other PC and PC-related technologies are inevitable? Here's my short list:

AUTOMATED 3D MODELING: Designing PC and console games is an unbelievably pricey and therefore risky venture, largely because of the aforementioned 3D revolution. As 3D graphics become more and more realistic, it takes more and more time—and therefore money—to draw and render them. Mark my words: Someday, someone is going to build a program that allows a small number of designers to generate a large number of 3D graphics. When that day comes, it will trigger a golden age of gaming as small shops gain the freedom to create the games of their dreams.

NO MORE CABLES: This one's a no-brainer, because no one likes the restrictions inherent to cables. The turning point for the cable castoff will come when someone figures out how to distribute electricity via wireless means. The downside to this, of course, is that a massive natural disaster could reduce a wireless humanity to the stone ages in the time it takes to say "humongous solar flare."

ALL-IN-ONE PORTABLE: Shamefully, we're still not there, but only the geekiest of tweedles actually wants to carry a cell phone, PDA, laptop, and MP3 player. It will probably take 10 years, but the all-in-one portable device is an inevitable technological evolution. The only question is: What form will it take?

BIOMODS: Right or wrong, it's clear that when it comes to performance—athletic, sexual, mental, or otherwise—humans desire enhancement. Since the usage of most drugs and chemicals are lethal in the long term, where does that leave us? Implanted bio-modifications that stimulate extra production of naturally-produced hormones and chemicals, or provoke higher muscle response or development, that's where.

Got some far-flung thoughts of your own? Drop me a line at: george@maximumpc.com.

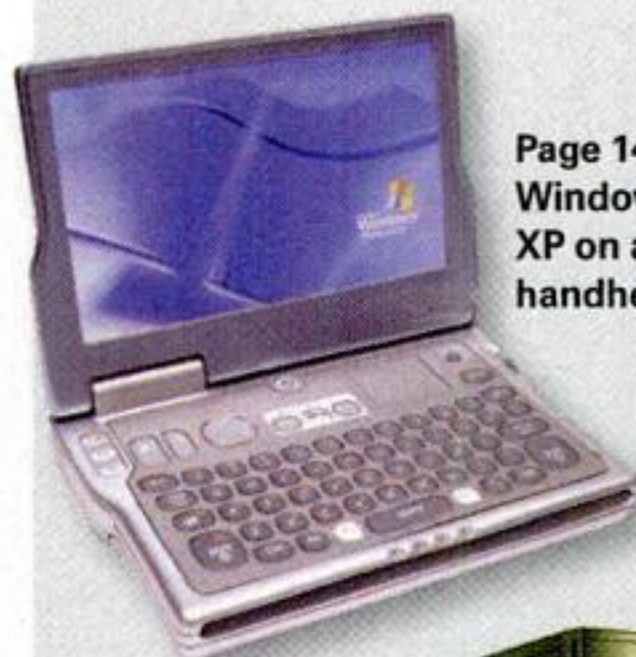
—GEORGE JONES

george@maximumpc.com

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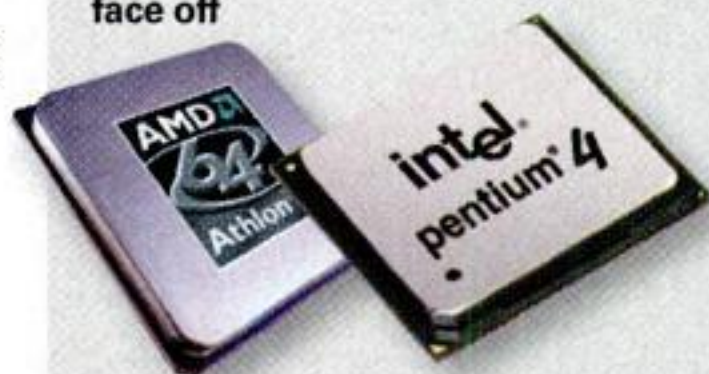
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If this month's mod could talk (you know, like HAL), it would sound like Barry White.

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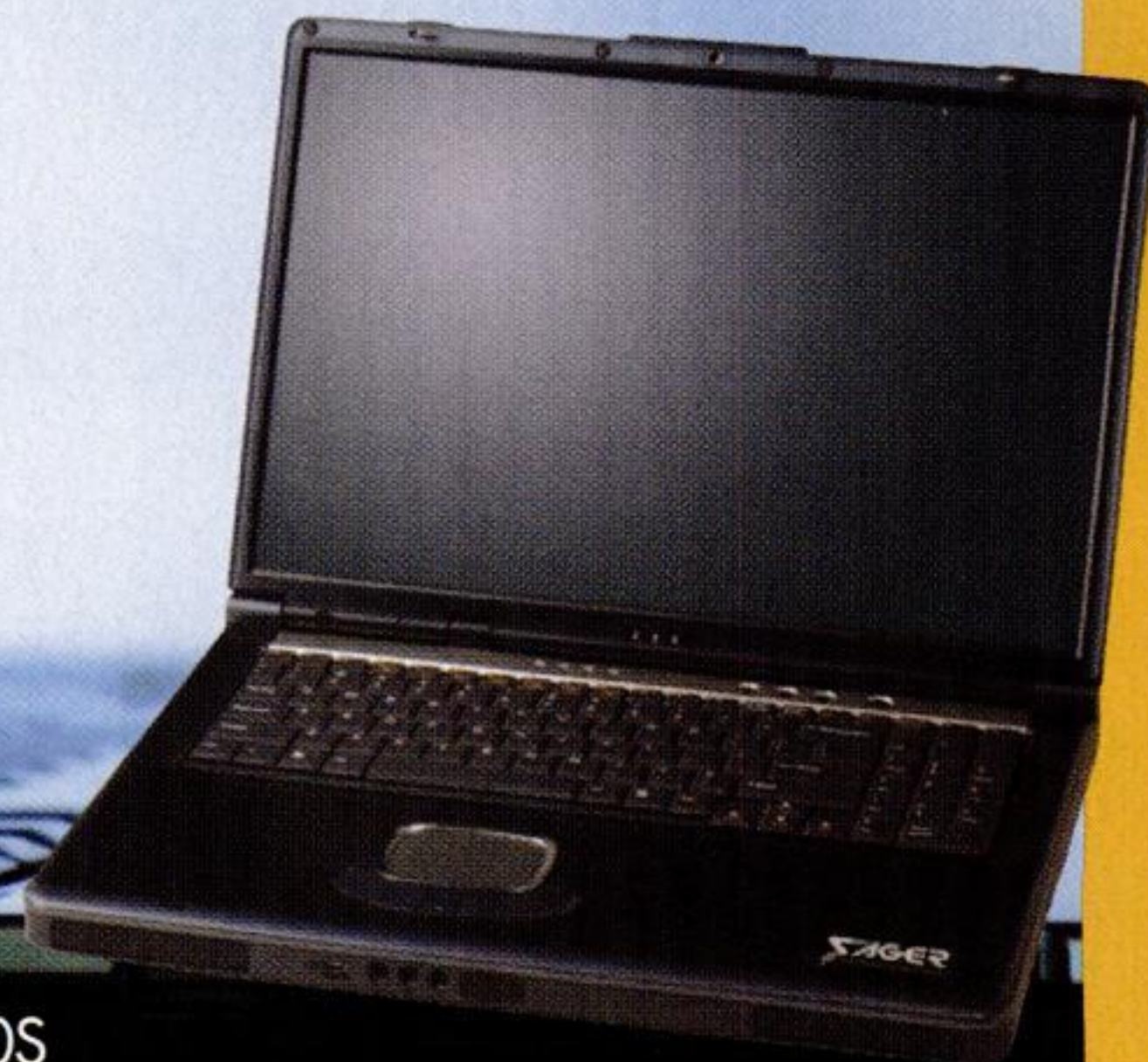
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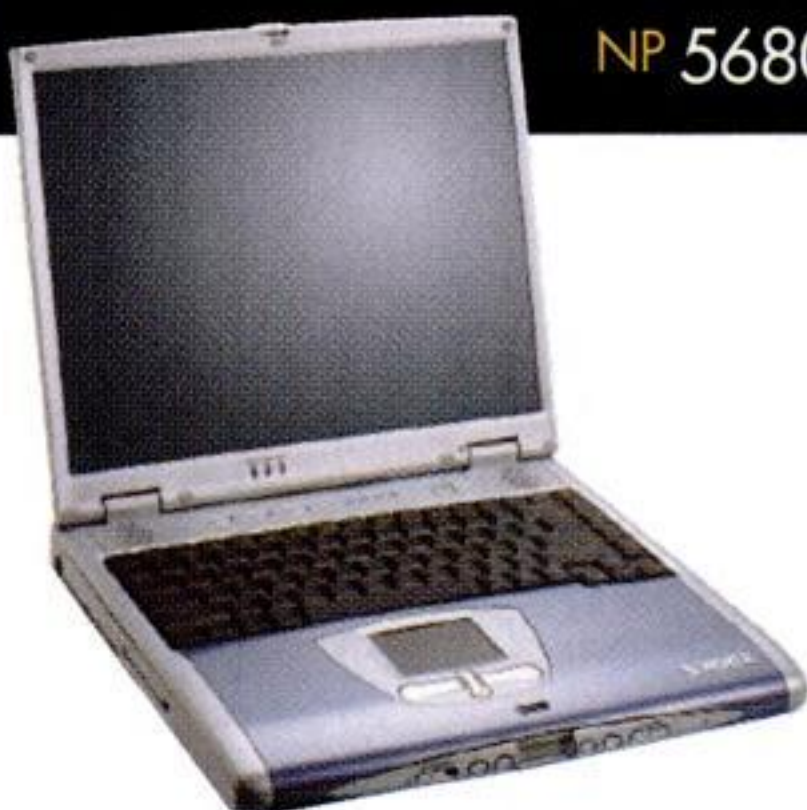
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LCD Challenge

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WONDERING ABOUT SAGER

I got my April issue of *Maximum PC* in the mail today and I immediately opened it to the notebook reviews feature ("Power Notebooks," page 52) as I'm in the market for a new one. Unfortunately, you didn't include the Sager NP8790 laptop, which I was thinking of buying. Top-of-the-line Sager machines come with a pair of 7,200rpm drives in a RAID array and I think this could help the Sager machine beat the Dell XPS in

your benchmarks. I just wish someone I trusted would review this killer rig (hint, hint).

—JAMES CLASEMAN

SENIOR EDITOR GORDON MAH UNG RESPONDS: We'll try to review a Sager notebook in a future issue. The XPS, by the way, does support RAID as well but the feature wasn't available at the time of our review.

CHOOSING BETWEEN VIA AND NFORCE

I have two questions. I'm

planning to buy a new Albatron motherboard but can't decide which chipset to go with. The contenders are VIA's KT600 and nVidia's nForce2 Ultra 400. In your opinion, does one have an edge over the other, or could I simply decide by choosing which board layout I like best? I also want to know about Kingston's HyperX memory: Is this memory worth the higher price than Kingston's ValueRam? I realize the HyperX modules operate at a lower CAS rate, but does that justify the price increase?

—BRIAN WEIGAND

SENIOR EDITOR GORDON MAH UNG RESPONDS: If we had to make a choice, we'd go with the nForce2 chipset. We dig the nForce2's dual-channel controller and the advanced audio capa-

bilities of the south bridge. Keep in mind, we're making general chipset statements as we haven't reviewed the exact motherboards you're interested in.

Regarding Kingston's HyperX RAM, it's great for people who want to overclock. If you're not a mad overclocker, the few percentage points the HyperX gets you may not be worth the extra coin. For that matter, the few percentage points the nForce2 Ultra 400 has over the KT600 may not be worth it either, if you want to save even more cash.

THEY HAVE WAYS OF KNOWING

In a letter regarding his use of his school's LAN to share files, Rick W. writes: "What I did was wrong but they had no way of knowing that." As an IT administrator, I can tell you this just isn't true. I don't

PRESCOTT BACK AND FORTH

WHY NOT PRESCOTT?

OK, I understand that you're not impressed with the Pentium 4 Prescott [March 2003]. No one is really, but that's how a new rollout goes. It will be better when the higher clock speeds come out, but I don't understand why no one is looking at the bright side.

If you look at your benchmark chart on page 34 of the feature and compare the Prescott wins with those of the P4 Extreme Edition, the P4EE wins 20 of the 31 tests. But if you take out the categories where the scores are close, the margin narrows significantly; the P4EE wins just 12 of 23 tests. All you need is one more category on the bottom called affordability and you can chalk one up for the Prescott. Assuming the Prescott 3.2 is around \$275 to \$300 it seems like a no-brainer to me; the Extreme Edition costs five times as much.

—KYLE WOODHOUSE

PRESCOTT TOO HOT!

Your review of the Prescott core sounded as if you were getting

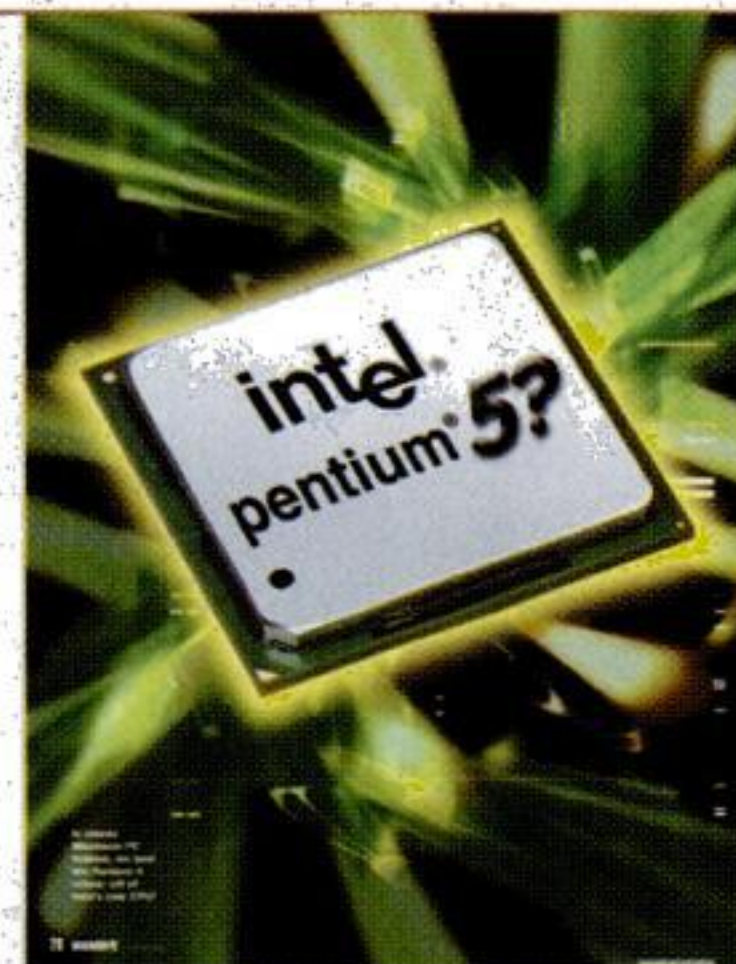
paid to say good things about it. Let's look at what you "forgot" to mention about this new CPU: First, it runs incredibly hot. If you take the 2.8E Prescott and overclock it to, say, 3.5GHz, it will nearly burn up! In almost all applications, it performs slower than the P4C processor of the same speed, and the additional pipelines hinder performance. Yes, I know it has improved branch predictors, but that's not enough to cover the lost ground. AMD is looking better and better every day.

—BRANDON GATES

EDITOR IN CHIEF GEORGE JONES RESPONDS: Our March issue's analysis of Intel's new Pentium 4 Prescott stirred up a hornets' nest of controversy. In that article, we advised holding off on purchasing Intel's newest CPU until the end of the year because the performance boost isn't quite there. Interestingly, your responses to our position were split 50/50—half of you thought we were dead-on with our impressions and the other half thought we were smoking crack.

PRESCOTTS OF TOMORROW

I found your recent article on the Prescott chips to be very enlightening, but I have a few



Why Isn't Prescott Pentium 5?

How does Intel's new Prescott CPU stack up? Is it worthy of residence in your existing motherboard? *Maximum PC* Senior Editor Gordon Mah Ung investigates the low-key release of a redesigned, feature-laden chip that deserves to be called Pentium 5, yet surprisingly isn't.

Sometimes, even good news about cutting-edge chips can be a little disappointing. Take the example of Intel's new CPU, code-named Prescott. Despite its many accolades, Prescott is struggling to make its way into the hearts of PC enthusiasts. And even if it does, it's not clear if it's worth the wait. So, we've got a question: Why isn't Prescott Pentium 5?

questions. First, will a mobo that supports Prescott today support a 5GHz Prescott or even a 10GHz Prescott later? Common sense tells me no, but I would like to be sure. Second, when can we expect to see Prescott reach the presumed speed cap of 10GHz? Finally, with Intel expected to release Tejas this year, do you think it's likely Intel will continue to increase speeds on Prescott chips all the way to 10GHz, or do you think all efforts will be concentrated on Tejas?

—ROLF HAWKINS

SENIOR EDITOR GORDON MAH UNG RESPONDS: It's highly unlikely any motherboard that's on the market

when you read this will be able to support a 10GHz Prescott. It's also unlikely we'll see a 5GHz Prescott in the currently available Socket 478-based Intel boards. By the end of this summer, Intel should have introduced its so-called "Socket T" interface along with Tejas. Tejas and Socket T will probably carry us past the 4GHz mark. Intel typically introduces some overlapping speeds among interfaces, but the company "encourages" people to move to the promised land very quickly. Keep in mind that Prescott itself will not reach 10GHz, nor will Tejas, but iterations of the CPUs and the NetBurst architecture will scale to 10GHz. It's hard to say when, but our best guess at this time is 2005 or 2006.



Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

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For more information on SanDisk Cruzer Mini, visit www.sandisk.com/maximum



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COMING NEXT MONTH

IN THE

**IF-IT-TINGLES-
IT'S-WORKING**

**JUNE ISSUE OF
MAXIMUM PC**

**SPEED! SPEED!
SPEED!**

Buried deep below the earth somewhere in northern New Mexico, *Maximum PC*'s top-secret testing facility has been focusing its unflinching gaze upon all manner of speed-related issues and challenges. You won't believe what we've come up with this year. Yowza!

PC GEEK QUIZ

Hey, smart guy—think you know everything about computers? Think again. It's time for our annual PC Geek Quiz. Here's just a sample of what's in store: Which PC component uses a "voice coil"?

Show us what you're made of next month!

POWER SUPPLIES

Cloaked in mystery, the sole source of your PC's power—the power supply unit—is easily the most underrated component in your PC. Until now, that is. Next month our experts will explain in detail how the PSU works, and how to determine which one is right for you.

PLUS

How to build your own media server, more LCD reviews, the craziest computer workstation you've ever seen, and more!

know about the IT department at Rick's school, but I can tell you that almost any network's IT staff should be able to monitor the data flowing over its connections and can easily capture and analyze any specific data packets of their choosing.

People need to realize that using the Internet, especially through a school or office LAN, only has the appearance of anonymity. Most network admins worth their salt can follow your activities if they are so inclined. Oftentimes, you don't even need that level of access: just ask the people who were sued by the RIAA for file sharing.

I agree that Rick should let this one slide. Using the LAN at his school is a privilege, and because it sounds like he didn't let them into his PC, I say no harm, no foul.

—JIM BAUSCH

STAY AWAY FROM CHANNEL 6!

You forgot something in your "Wi-Fi Wonder" article [March 2004]. You should never use Channel 6. I cannot stress this enough. Cross chatter, caused by you and everyone else on your block using the default Channel 6, is a major problem with Wi-Fi connections and can lead to large drops in signal strength.

—MATT

TECHNICAL EDITOR WILL SMITH

RESPONDS: We hesitate to say you should *never* use Channel 6, but you're right, Matt. In most crowded urban environments, there are several wireless access points within a single block. Because most APs use Channel 6 as the default, it's a good idea to switch your access point to another, less-used channel.

MAXIMUM PC IS BETTER THAN SCHOOL!

I am a high school senior who started reading your addicting mag in July and I'm officially hooked. In fact, just the other day, I went to check my mailbox and found a bunch of junk mail, my March issue of *Maximum PC* and a letter from the

Admission's Department of a university I recently applied to. This is what *Maximum PC* has done to me: I put the admissions letter on the back burner and read the magazine first. Yes, I put the next four years of my life on hold so I could flip through the pages of deliciousness that is *Maximum PC*.

—SAM LATTER

IF IT SOUNDS TOO GOOD TO BE TRUE...

I was reading an article on the How Stuff Works web site (www.howstuffworks.com) about the 2004 Consumer Electronics Show and was amazed at the possibility of what's being

anywhere near proving these chips are stable and capable of being mass produced.

Nonetheless, there's a ton of research being done on optical memory that uses light to store and retrieve data in a three-dimensional crystalline structure. We've even seen research on "holographic" memory that allows you to retrieve data from a damaged chip (think about how when a holographic image is broken in two, it creates two whole, but smaller, holographic images). But it will be some time before these technologies come home to roost in your personal rig.

Frankly, Atom Chip's spouting of strange, vaguely scientific-sounding words ("nanomicros," "atom-optical") strikes us as kind of

**MOST NETWORK ADMINS WORTH
THEIR SALT CAN FOLLOW YOUR [ONLINE]
ACTIVITIES IF THEY ARE SO INCLINED.**

called quantum-optical RAM. I followed a lead in the article and visited Atom Chip's web site (www.atomchip.com) and saw the device mentioned in the article. Supposedly, it's the size of a USB connector and holds 256 gigs! It's also nonvolatile and fast enough to be used as RAM! I can't tell if this is for real or not but I figured you guys could find out.

—TIMUR OMAR

FEATURES EDITOR LOGAN DECKER

RESPONDS: While many companies attend CES to get information about their products to consumers via the press, there are others who are there mainly to attract the interest of investors or prospective partnerships.

Atom Chip Corp. may well have produced a 256GB chip in a widget the size of a USB connector, but that doesn't mean the company is

sketchy. And we have no idea what is meant by "quantum optical" technology. Is Atom Chip implying that quantum states are being used to store and retrieve information? To our knowledge, technology is years away from doing so in any practical application.

So if you're looking to invest, we think you might be better off with something like ImClone.

CUT, COPY, PASTE

►We goofed on page 34 of our April issue's Ultimate Do It Yourself Guide. In the "Get News Delivered Directly to your Windows Desktop" project, the URL for FeedReader should be www.feedreader.com.

LETTERS POLICY: *MAXIMUM PC* invites your thoughts and comments. Send them to input@maximumpc.com. Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.



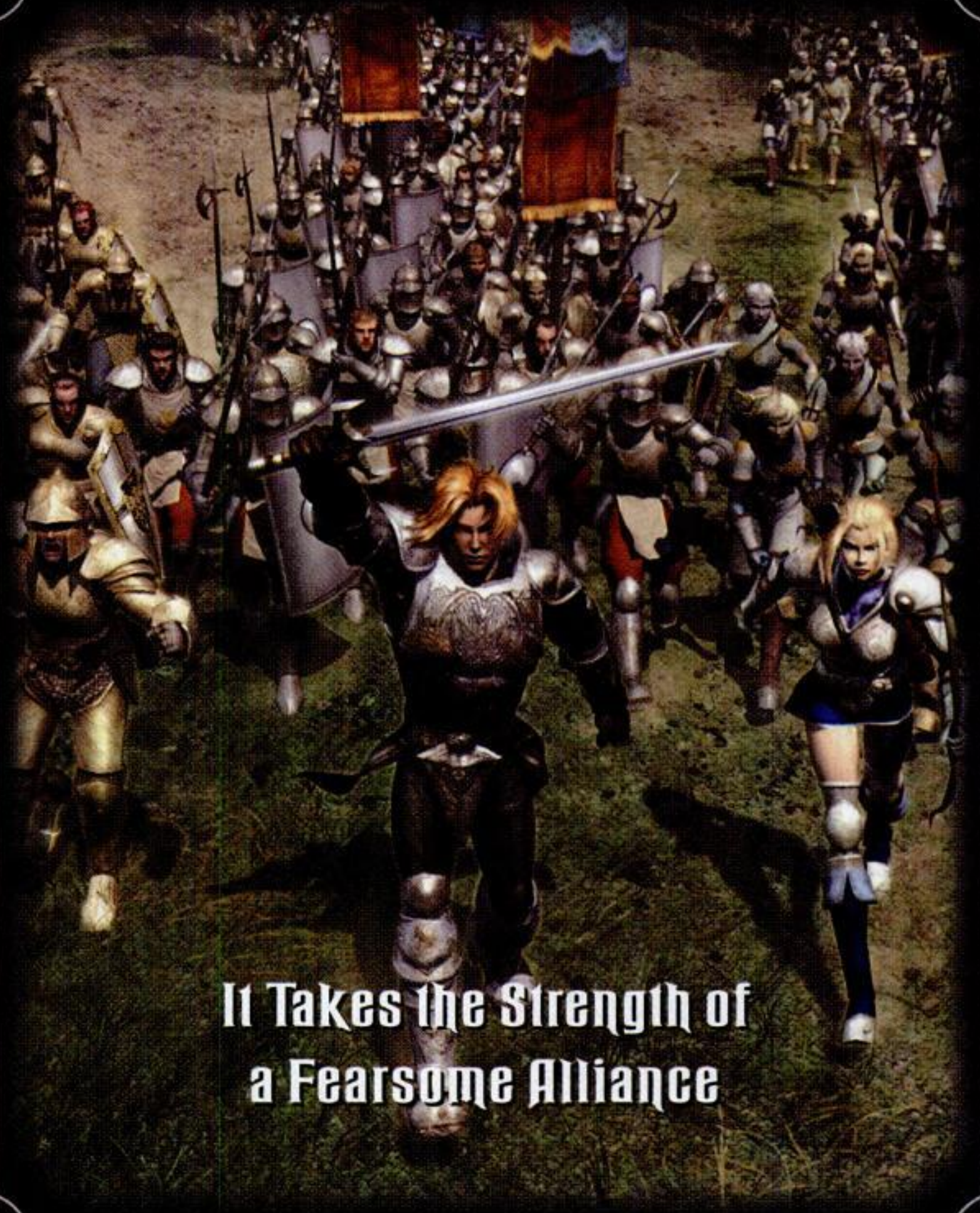
**It Takes the Will of
a Single Warrior**

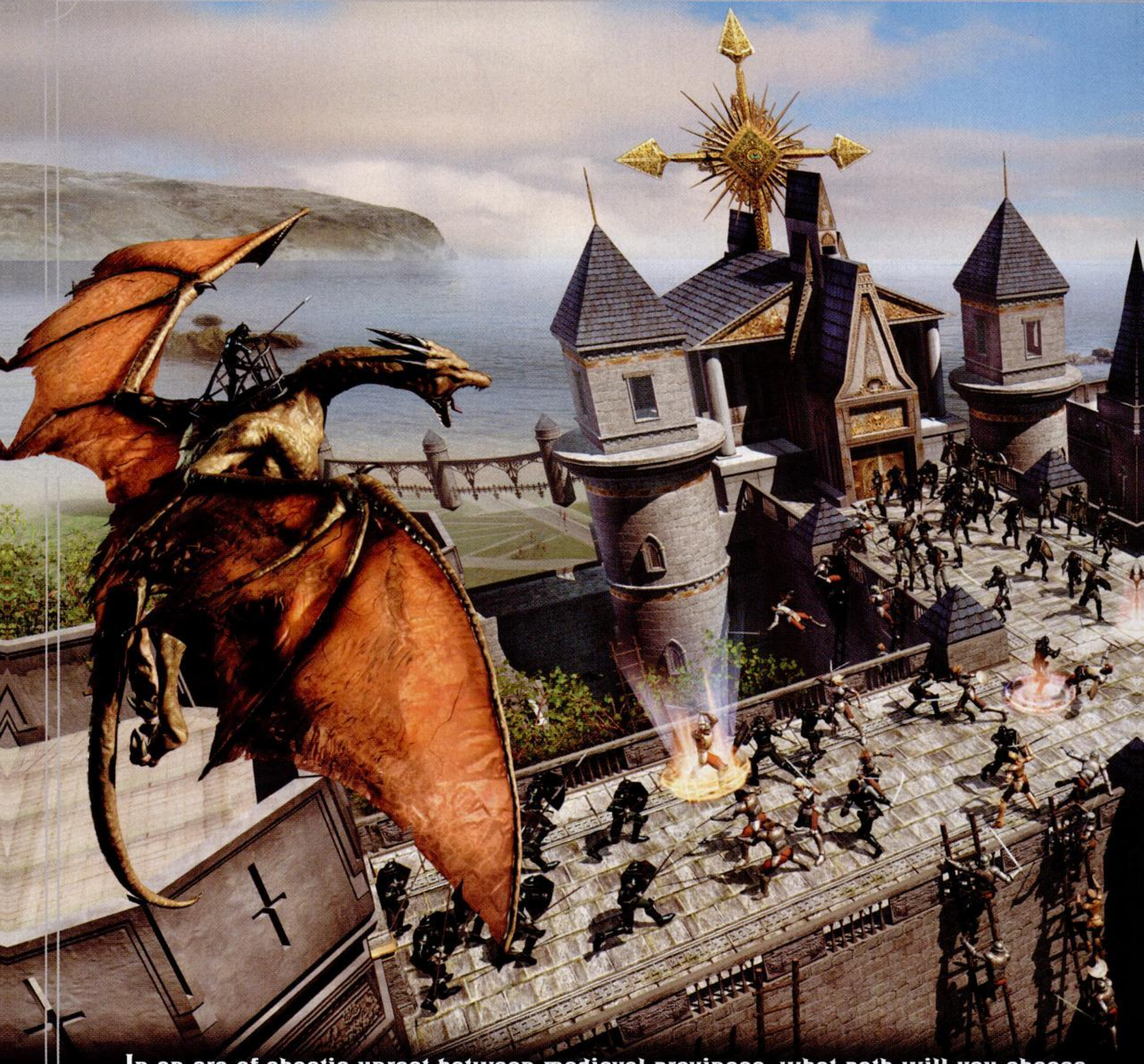


It Takes the Skill of a Mighty Clan



**It Takes the Strength of
a Fearsome Alliance**





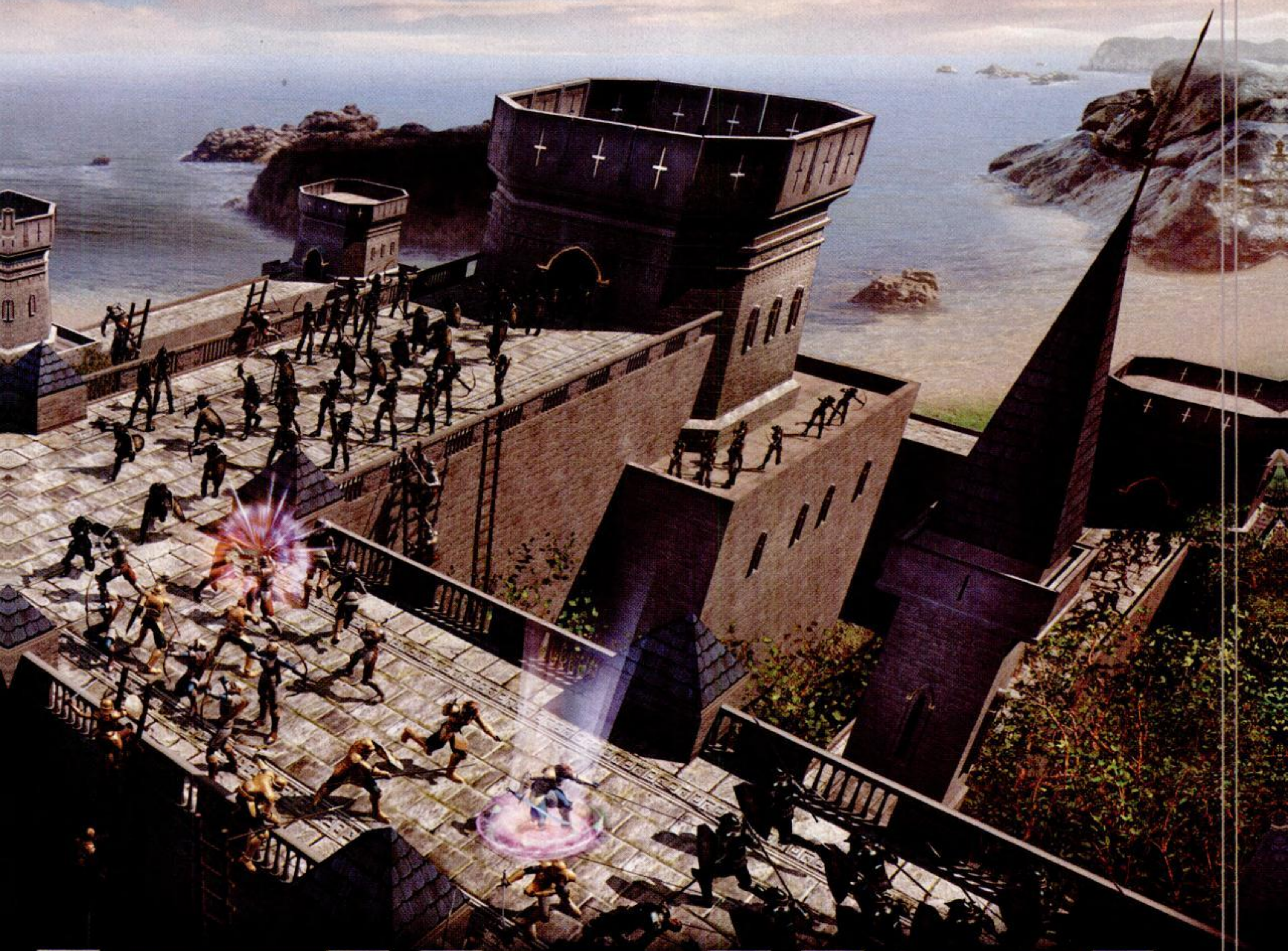
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Quick Start

The beginning of the magazine, where articles are small

Monster Drive Madness!

Hitachi introduces two speedy, supersized drives for media gluttons. We dust off some seriously big words to describe them

Incredible speed... luxurious, roomy interior... now available in black...." It sounds like we're discussing SUVs, but this description applies to two new Hitachi hard drives: the 7K400, a 7,200rpm drive with an unprecedented 400GB of storage, and the 10K300, a 10,000rpm 300GB "enterprise" drive available for commercial use.

The 7K400 and 10K300 are Hitachi's first five-platter high-end drive iterations (its drives have typically used four platters), and both drives are capable of containing 61.7 billion bits of data per square inch. This level of areal density—the amount of data that is packed onto a storage medium—was once considered impossible by engineers because of

a phenomenon known as the *superparamagnetic effect*. Simply put, when the magnetic energy holding bits of data becomes equal to the ambient thermal energy within the drive itself, the data bits can no longer maintain their magnetic orientation—and that means they can't be relied upon to store data. Luckily, Hitachi acquired IBM's recipe for antiferromagnetically-coupled media (AFC) that can withstand the sinister-sounding superparamagnetic effect.

The 7K400 is the first consumer drive to integrate the ATA/7 feature set, which allows OEMs to optimize the drive for time-sequencing (important in audio and video applications) or data integrity (important to the rest of the world). It's

also the first drive from Hitachi to feature a "latching" Serial ATA connector, which is less

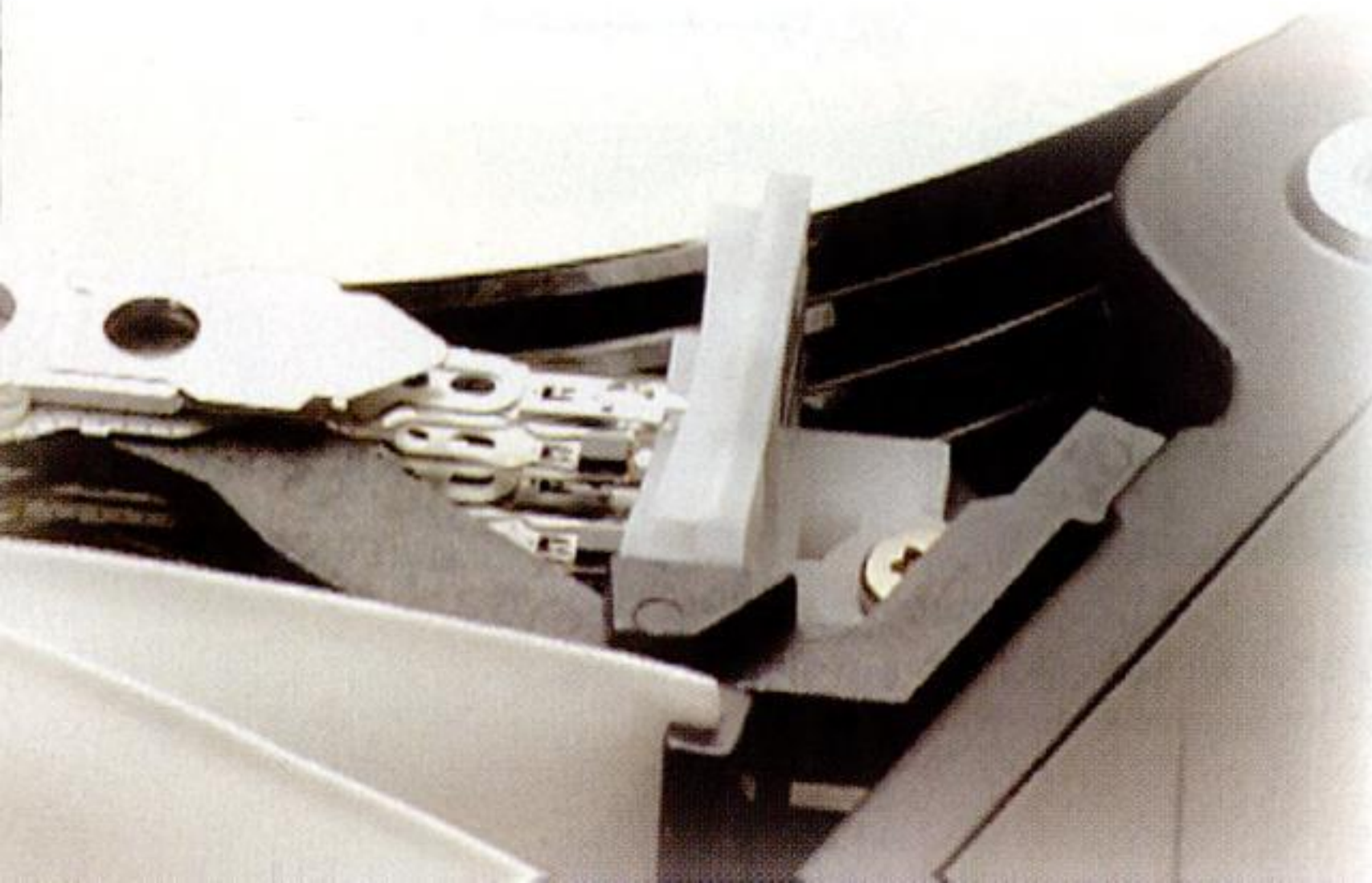
Although Hitachi's 10,000rpm, 300GB 10K300 is intended for commercial use, technology "trickle down" will eventually pay off in consumer hard drives.

likely to be shaken loose over time than the standard SATA connector.

Interestingly, PC storage isn't the only technology pushing the industry toward increasingly larger drive sizes. The 7K400 was also created with set-top digital video recorders (DVRs) in mind; the drive can hold up to 45 hours of HDTV broadcasts.

That's not something you'll hear in an advertisement for the latest big-ass SUV.

This white plastic assembly that sits on the tip of the hard drive heads of Hitachi's two new drives is a "loading ramp." The drive heads are parked here when the drive is powered off so that the read/write heads don't rest on the delicate media surface.



Why My Tablet Is Indispensable



Note to the good people at HP: Remember that Tablet PC you let me borrow? Yeah, that's right, the TC1100. Well, I've got some bad news for you—you're not getting it back. *It's become an indispensable part of my life, so I have decided to keep it.*

Regular readers of the column will remember that I embarked on a long-term road test of the TC1100 last month. I wanted to know if a Tablet PC could be a legitimate replacement for notebooks and PDAs. Well, my basic conclusion is that it's a replacement for neither, but is still too invaluable to give up. It comes down to this: If you're like me, and you want to look up movie information on IMDB.com from the comfort of your living room couch, or search recipes on Epicurious.com from the convenience of your kitchen, there is no better "solution" than a Tablet PC with Wi-Fi support.

Now, let's be clear here. It is *not* easy to enter text into the thing. Microsoft's current handwriting recognition is laughable, so if you want to type in URLs or what have you, you must either activate the Tablet's virtual keyboard and hunt-and-peck with the stylus, or use the TC1100's physical keyboard. Some have praised the TC1100's inclusion of a physical keyboard, but let me tell you, when you're reclining on your couch, trying to find character information on Tony Blundetto, your hands aren't in any position to comfortably type. In fact, I would never conceive of using the TC1100 as a notebook replacement, not only because its keyboard layout is too small and cramped, but also because the device lacks a built-in optical drive, and thus loading software is a protracted affair.

Is the TC1100 a PDA replacement? No. Any Tablet with a screen large enough for web-surfing is not a device I'd want to carry in my cargo pants. That said, while I would never attempt to enter text into a PDA during a management meeting, I have already used the TC1100 numerous times to jot down long-hand notes with digital ink.

If Tablet PC manufacturers were smart, they'd focus on the platform's strengths: web surfing in unconventional locales, and creating handwritten notes. But until handwriting recognition develops the AI of *The Matrix*, Tablet PCs will never be effective PCs for word processing. These devices should cost no more than \$500, and should be marketed solely to trumpet their two key assets.

I love my new Tablet PC. I just know that it will never be my primary computer.

The FlipStart miniPC

We make first contact with Vulcan to explore a strange, new ultra-portable world of computing

The idea is simple: Combine the power, flexibility, and compatibility of Windows XP with the instant-on, always-available portability of a handheld. Seattle-based Vulcan isn't the only company working toward this lofty goal, but it does have something no one else has. Actually, *someone*, and that would be Paul Allen, the same Paul Allen who shared a slide rule and pocket protector with Bill Gates as they launched Microsoft.

Ever the visionary, Allen founded and initiated Vulcan's miniPC project, so it's not terribly surprising that the FlipStart is being built to run Windows XP (both Home and Professional). The specs are impressive for a device this size: a 1GHz Transmeta Crusoe processor, 256MB RAM, a 30GB internal hard drive and a 5.6-inch screen that

supports resolutions up to—get this!—1024x600. The FlipStart will also sport 3D graphics with 8MB of video RAM, USB 2.0 support, and integrated 802.11b and 802.11g. Amazingly, the whole ball of wax will weigh just a single pound.

Navigation and text entry don't require external peripherals; the FlipStart has a built-in thumb keyboard, trackpad, scroll wheel, and left/right mouse buttons.

You'll even be able to hook up an external keyboard and mouse via the USB ports.

Another interesting twist is the "low-

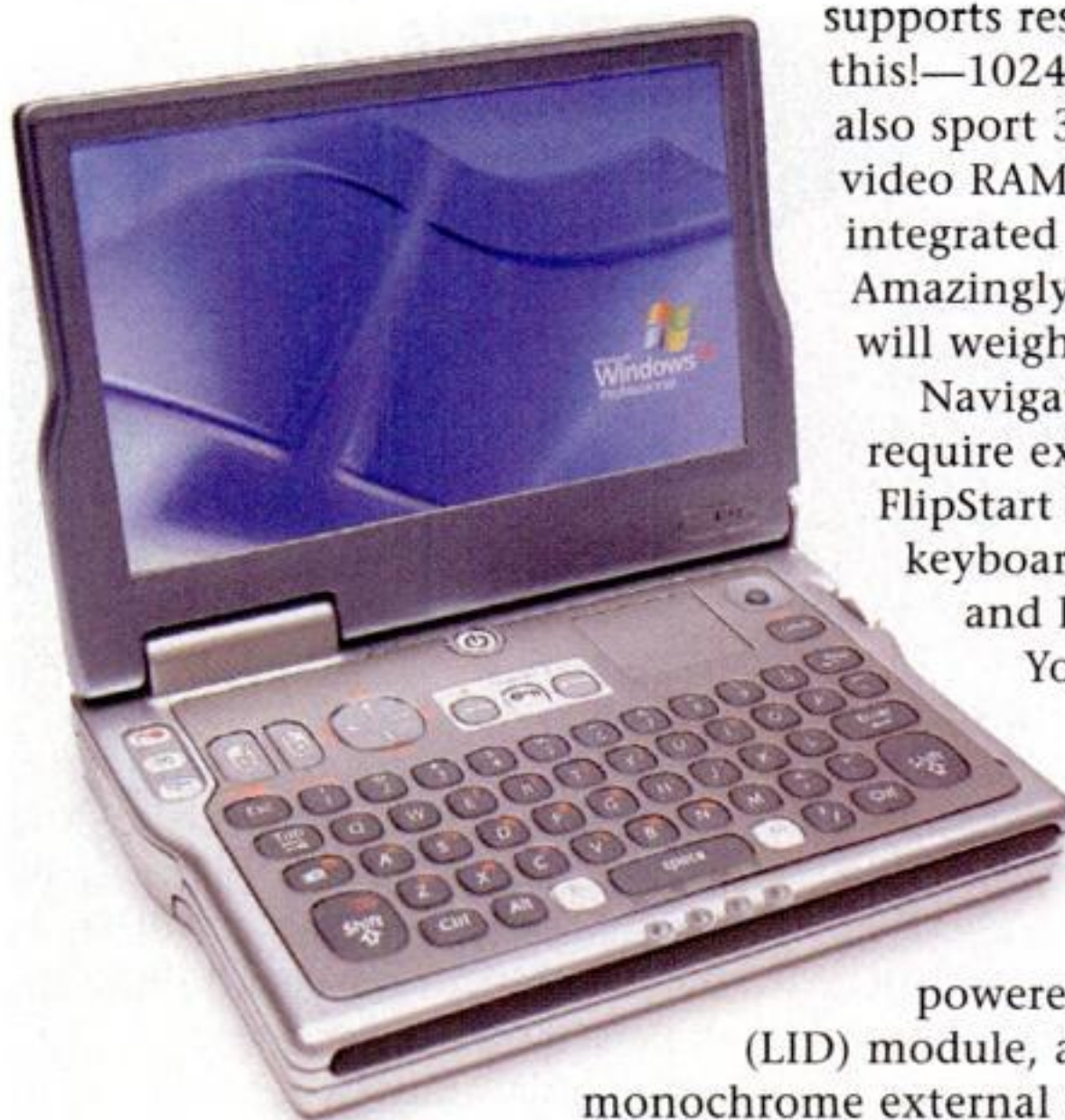
powered interactive display"

(LID) module, a touch-sensitive,

monochrome external display that lets you check your e-mail or scroll through an MP3 playlist without

having to power up the built-in color LCD screen. Unfortunately, Vulcan wouldn't reveal how this external device will clamp onto the FlipStart. We suspect that a slightly more sophisticated technique than a rubber band or Velcro will be used.

Vulcan hasn't committed to a release date or price, but it's clear the company would like to see FlipStarts everywhere by this holiday season. So if you want a real PC in your pocket, start saving now.



At 5.8 x 4 x 1-inches, the FlipStart should be the smallest XP-bearing handheld ever.

Jon Phillips was formerly editor-in-chief of Maximum PC, and now serves as the magazine's editorial director.

Intel Talks Future Tech

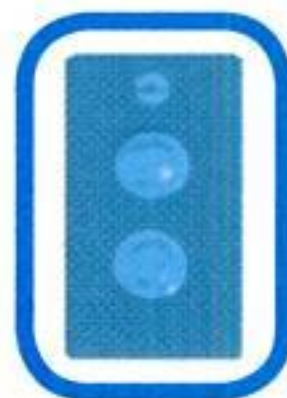
Wireless USB, Metropolitan Wi-Fi, and integrated HD Audio are on tap for 2005

Intel's Developer Forum (IDF) recently offered us an opportunity to chat with the chip making giant about the company's vision for future CPUs, chipsets, formfactors, and more. Here's what we learned about the upcoming technologies Intel is most excited about. Commence holding your breath... now.

WIRELESS USB: Imagine never having to plug in a USB cable again! Intel is pushing for a Wireless USB spec that would create a low-cost, high-speed, short-range wireless technology to work seamlessly with USB. It is projecting speeds of 480Mb/s at a range of up to 10 meters, with 1Gb/s on the horizon. WUSB would use ultra-wideband technology and could spell the death of Bluetooth. Expect the first devices to surface next year.



HIGH-DEFINITION AUDIO: Is it possible that onboard audio won't suck in the future? Intel thinks so; the company is pushing an eight-channel integrated audio spec, code-named Azalia, with support for up to 96KHz (192KHz in stereo mode) as well as DVD Audio. Dolby is a key partner in HD Audio, and several of the company's technologies will be featured in HD motherboards, including a software decoder that runs off the CPU. The first HD Audio mobos are expected by this summer.



WIMAX: DSL and cable woes may be a thing of the past if WiMax works out for use in next-gen networks known as Metropolitan Area Networks. Currently being hammered out by the WiMax forum—on which Intel plays a significant role—the new 802.16 spec promises to put an end to the difficulties involved in running broadband through outdated cable coax and telephone lines by eliminating cables entirely. WiMax is expected to reach 70Mb/s speeds from up to 30 miles away using microwave beams transmitted by central towers. Intel predicts the first 802.16 implementations will debut in the first half of 2005.



FUN-SIZE NEWS



WOULD YOU LIKE THAT CD VENTI OR GRANDE?

HP and Starbucks are launching a line of coffee shops called "Hear Music Coffeehouse." Not only will customers be able to get a cup of Joe or Frappuccino, but they'll also be able to listen to libraries of digitized music, create compilation discs, and burn them to CD, (perhaps Starbucks will insist on calling them *disco compattos*). The first store was launched in Santa Monica, Calif.—we expect to see the second store spring up right across the street.

CAN CAN-SPAM CAN SPAM?

A four-company posse comprised of Microsoft, America Online, Earthlink, and Yahoo are pelting spammers with the first round of lawsuits based on the legislation known as CAN-SPAM (short for Controlling the Assault of Non-Solicited Pornography and Marketing—who comes up with this stuff?). Among the first schmucks in the crosshairs: the creepy trio of Barry Head and his two sons, Eric and Matthew, who are accused of collectively sending in excess of 94 million icky messages since the law went into effect on January 1, 2004.

GATEWAY AND EMACHINES TIE THE KNOT

While folks fussed over gay marriage in several states, nobody batted an eye over the 289.5 million dollar acquisition of eMachines by Gateway Computers. Nobody knows for sure what the ramifications of the union are, but most suspect that Gateway will begin shuttering its eponymous stores in favor of selling its spotted wares through third parties.

FAST FORWARD BY TOM R. HALFHILL

Answering the 64-bit Question



So, Intel finally came clean and admitted that its long-rumored 64-bit extensions for the x86 are real and coming soon. But Intel's disclosure raises new questions: How do Intel's extensions compare with AMD's? Are the two 64-bit architectures fully compatible with each other?

To find answers, I spent a week slogging through the 64-bit programming manuals from each company and interviewing their engineers. Among other things, I compared their 64-bit instruction sets, register files, memory-addressing schemes, context-switching behavior, interrupt handling, and support for 16- and 32-bit execution modes. Two conclusions emerged: It's apparent Intel patterned its 64-bit architecture after AMD64; and, with a few exceptions, the architectures are virtually compatible.

Consider for a moment the historical significance of those conclusions. Intel invented the x86 microprocessor architecture in 1978 and has aggressively guarded it for 26 years. AMD began licensing the x86 from Intel two decades ago, then fought a long legal battle to continue making x86-compatible processors after the companies became enemies. Now, in a stunning role reversal, AMD has introduced the most important extension of the architecture since 1985 (when the x86 expanded from 16 to 32 bits), and Intel has basically reverse-engineered it.

Intel's 64-bit x86 architecture is called Extended Memory 64 Technology (EM64T). Although Prescott has EM64T, it's not activated in current versions of the processor. Instead, EM64T will officially debut in the Nocona Xeon chip for dual-processor servers, due to ship before June 30. AMD64 processors have been shipping since early 2003.

EM64T is a somewhat redundant name, because 32-bit x86 processors already have extended memory addressing beyond 32 bits. EM64T and AMD64 define even more address bits, but the most significant extensions are new 64-bit instructions and registers, plus some additional 128-bit registers for media instructions. (Registers are temporary internal memory slots used by programmers.) My analysis revealed that EM64T and AMD64 have identical register files and nearly identical instruction sets. The differences come down to seven instructions. One instruction is unique to Intel, and the other six are supported by both companies, but not always in the same execution modes.

Hence Intel's reluctance to guarantee that 64-bit software will always be compatible with both 64-bit architectures, although Intel does promise to run the same 64-bit operating systems as AMD64. Indeed, future versions of EM64T and AMD64 will probably resolve their minor differences and become 100 percent compatible.

Tom Halfhill was formerly a senior editor for Byte magazine and now an analyst for Microprocessor Report.

UT2004: Fast is the New Slow



Although *Unreal Tournament 2003* had its share of problems, most of them were minor and notable only to long-term fans of the series. It's always puzzled me why this 3D shooter received such a chilly reception—although plenty of gamers bought it, few people got fervently, fan-boyishly fired up over what was essentially a fairly entertaining game.

Lately, I've been playing a good deal of *Unreal Tournament 2004*, and I'll be shocked if it doesn't generate considerably more enthusiasm this time around. I'm enthralled with the return of an excellently revamped Assault mode, and I'm thrilled with the unbelievable back-and-forth tension in Onslaught, which uses multiple control points (called nodes) to create a battlefield with clear goals and constant tension.

Interestingly, playing *UT2004* illuminated for me the reasons why the 2003 version failed to hook gamers. Even more interesting is that the conclusion I arrived at had nothing to do with the game itself, and everything to do with *World War II*.

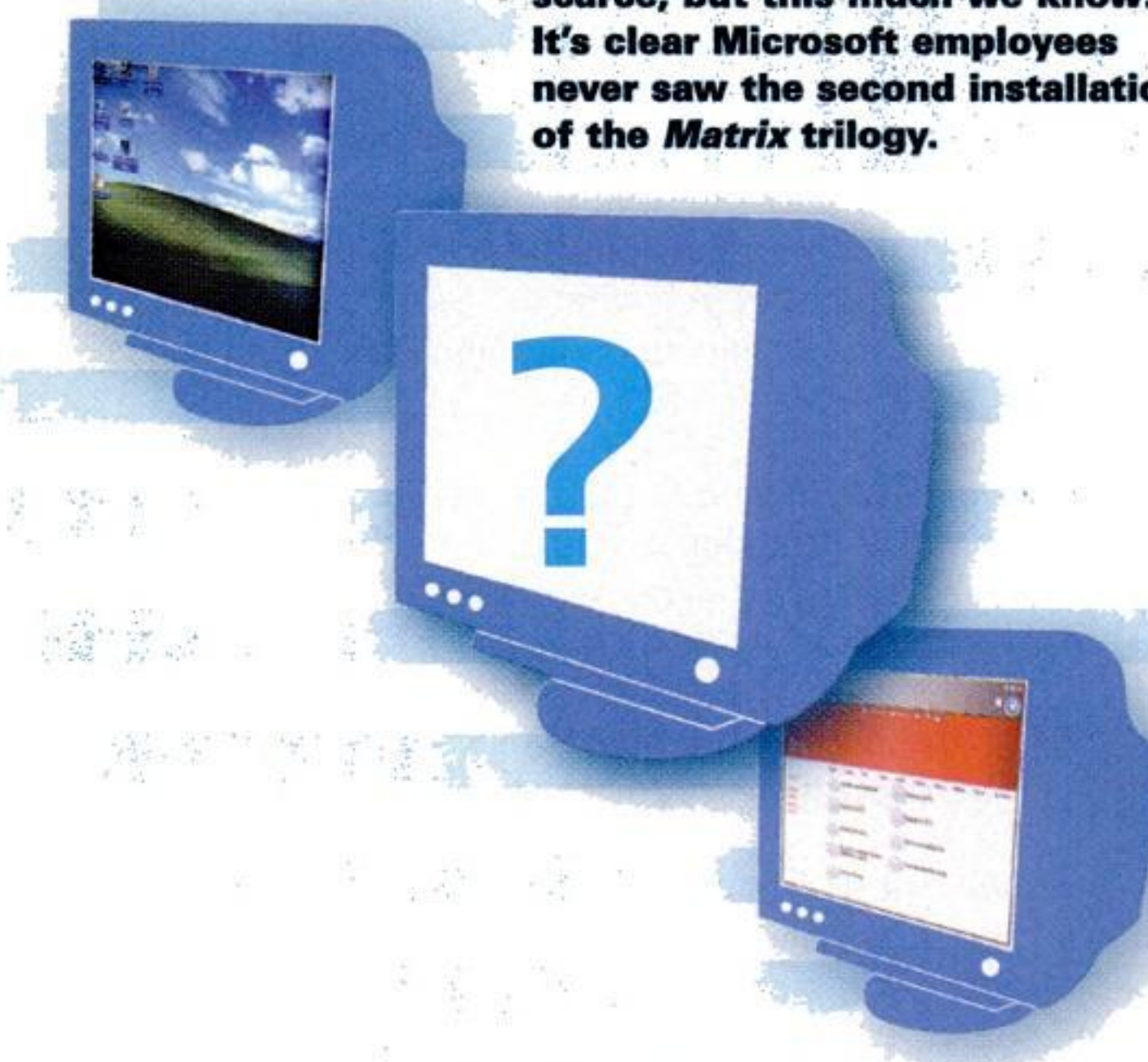
Back in fall 2002, *Dubya Dubya Two*—the war to end all wars—was literally impossible to escape. Shortly before *UT2K3* hit store shelves, *Battlefield 1942* came out and rewrote the book on multiplayer action gaming. On top of that, both *Return to Wolfenstein* and *Medal of Honor* still had plenty of life left on gamers' PCs. Maybe it was the times, or maybe it was the flood of WWII games, but realism was the zeitgeist of the gaming times. Gravitating towards multiplayer games with a little more realism and a somewhat more "relaxed" pace, players found that *UT2K3* felt like a drunk party crasher: a little too loud, a little too in-your-face.

But now here we are, with the next iteration of *Unreal Tournament*, and the landscape has changed. Military/tactical multiplayer modes are still hugely popular, and while *UT2004* still feels out of place, it's the good kind of out of place. After sneaking around for the last 18 months, the frenetic, run-and-gun pace feels like a breath of fresh air. And the inclusion of both land and air vehicles, which add to the speed and tactical finesse of both the Assault and Onslaught play modes, adds yet another dimension to the game's dynamite MP sessions.

In an interesting bit of timing, *UT2K4* hits PCs about the same time as *Battlefield: Vietnam*. This time, however, it's unlikely *UT* will be overshadowed. Gamers have been in the foxholes long enough, and they're ready for that burst of adrenaline-charged frenzy once again.

Tom McDonald has been covering games for countless magazines and newspapers for years. He lives in the New Jersey Pine Barrens.

Facts regarding Microsoft's rumored new interim OS, code-named XP Reloaded, are scarce, but this much we know: It's clear Microsoft employees never saw the second installation of the *Matrix* trilogy.



Windows XP Reloaded

Does Microsoft plan to release a new XP-based OS before Longhorn?

Like a nervous sweetheart confronted by a tenacious suitor, Microsoft has apparently gone from "no" to "maybe" to "yes" with regards to an interim release of Windows XP before the debut of Longhorn in 2006. A number of sources claim that Microsoft insiders have confirmed the preparation of an operating system update code-named XP Reloaded. On the record, however, Microsoft is still being coy with the details, including whether or not it will charge users for the update. Here's a rundown on the rumors, and what we think Redmond will actually deliver.

RUMOR ➤ XP Reloaded will consist of just a set of updates and security patches.

Our prognostication: Nope—even if XP Reloaded is free, you can bet it will include more than just fixes. There are plenty of technologies Microsoft would love to see on the desktops of the world, like DirectX 10, and the next iteration of the *Windows Media* series.

RUMOR ➤ XP Reloaded will offer a web-based installer.

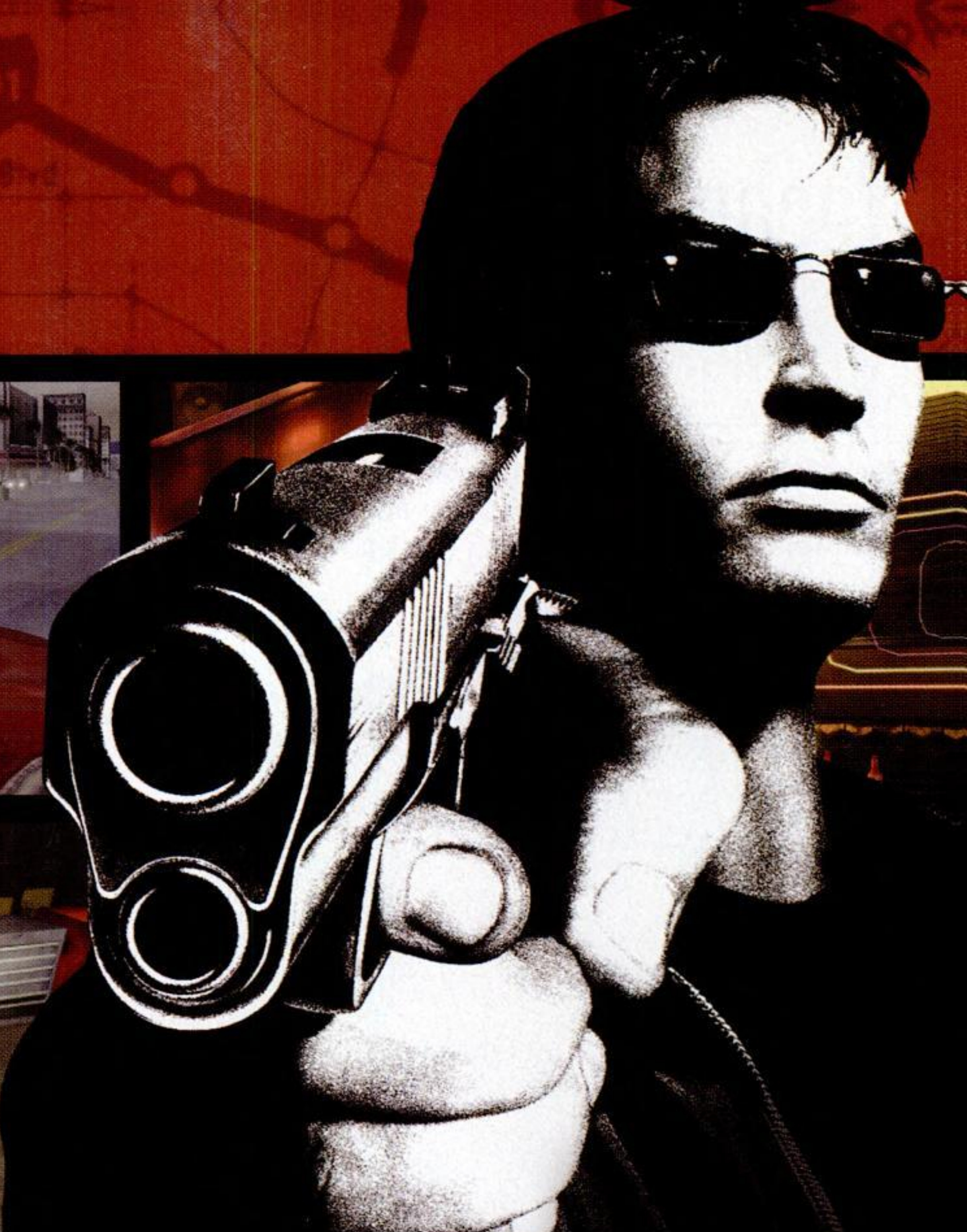
Our prognostication: Likely. This will make an interim release even more attractive to casual upgraders (if not commercial licensees), particularly if it offers the option of downloading and installing specific features and updates, instead of being forced to spray a whole package of Microsoft-branded widgets into your OS.

RUMOR ➤ XP Reloaded means that Longhorn will be delayed yet again.

Our prognostication: Not necessarily. The word is that Microsoft is extremely nervous about letting Linux breed on desktops while the oft-delayed Longhorn is still in the works, so XP Reloaded may be intended to keep PC owners from defecting until the fresh-brewed OS is ready.

“★★★★★”
—Maxim

“Best Action Game”
—Spike TV Video Game Awards



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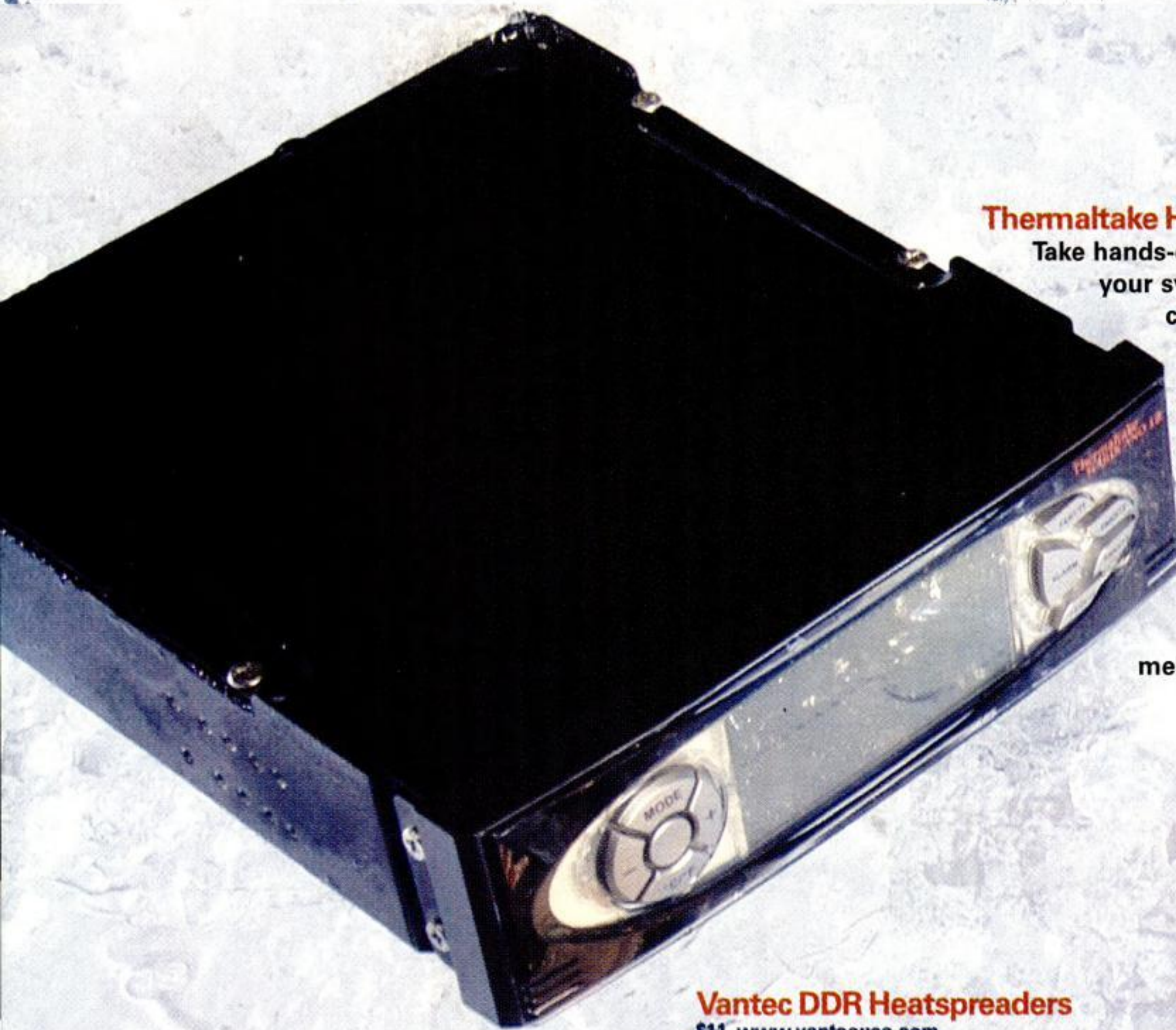
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TechnoFile

Quick takes on technology trends

THIS MONTH: Add-on PC Cooling Products

If you think a CPU cooler and some case fans are all you need to manage your system temperature, think again. As PC components get faster and faster, the need to cool neighboring components becomes crucial. This month, we take a look at six products that can help you put your entire system on ice.



Thermaltake HardCano 12

Take hands-on control of the numerous fans that inhabit your system with Thermaltake's HardCano 12-fan controller. The unit mounts in a 5.25-inch bay and comes with four fan connectors, all of which are enclosed in sleeving to help minimize cable clutter. Four thermal sensors help you keep track of internal temperatures, and a bright, backlit LED display makes controlling fan speeds and monitoring system temperatures a breeze. The clincher: A handy alarm alerts you in the event of a fan failure, helping you avoid a potential thermal meltdown. \$59, www.thermaltake.com

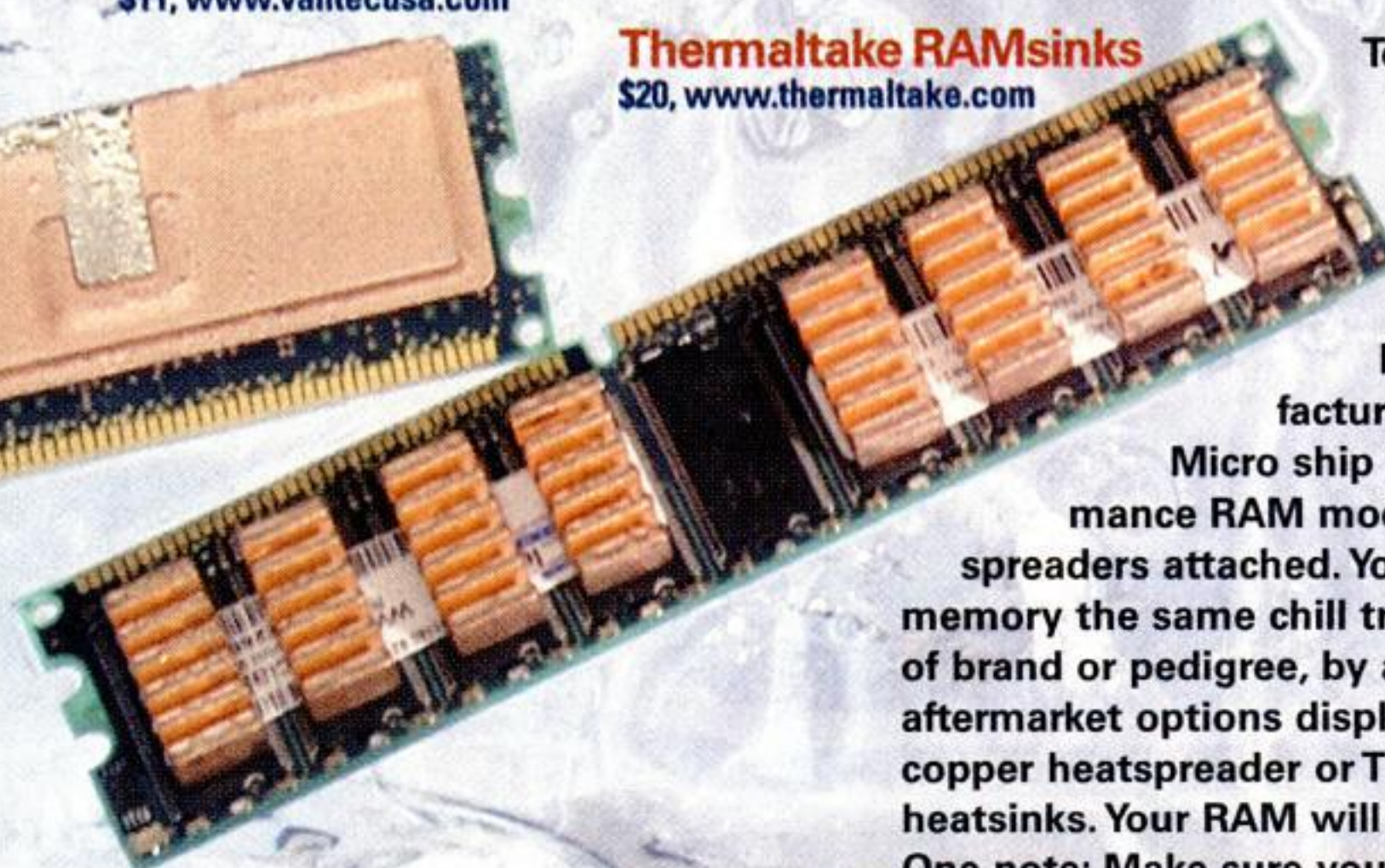
Vantec DDR Heatspreaders

\$11, www.vantecusa.com



Thermaltake RAMsinks

\$20, www.thermaltake.com



Today's high performance RAM runs much hotter than the memory of yesteryear, which is why leading RAM manufacturers such as Corsair

Micro ship their high-performance RAM modules with heat-spreaders attached. You can give your memory the same chill treatment, regardless of brand or pedigree, by adding one of the aftermarket options displayed here: Vantec's copper heatspreader or Thermaltake's RAM heatsinks. Your RAM will thank you for it. One note: Make sure your case has adequate airflow to draw away the dissipated heat.

Vantec Spectrum Fan Card

The Vantec Spectrum fan card is a "cool" product in every sense of the word. Plugging it into an available PCI slot provides increased airflow over and around any nearby PCI or AGP cards via twin adjustable-speed fans, and it also gives your system a visual lift with its built-in LED light and UV reactive material.

\$19, www.vantecusa.com

Zalman Heatpipe Hard Drive Cooler

Hard drives generate significant amounts of two things your system doesn't need more of: heat and noise. Zalman's heatpipe hard drive cooler can help you deal with both. This cage-like cooler is composed of thermally conductive aluminum bars that draw heat away from the drive where it can be easily dissipated by air moving over the heatpipes. Four vibration-dampening screws are also included to help keep the drive quiet. As Martha Stewart used to say, it's a good thing.

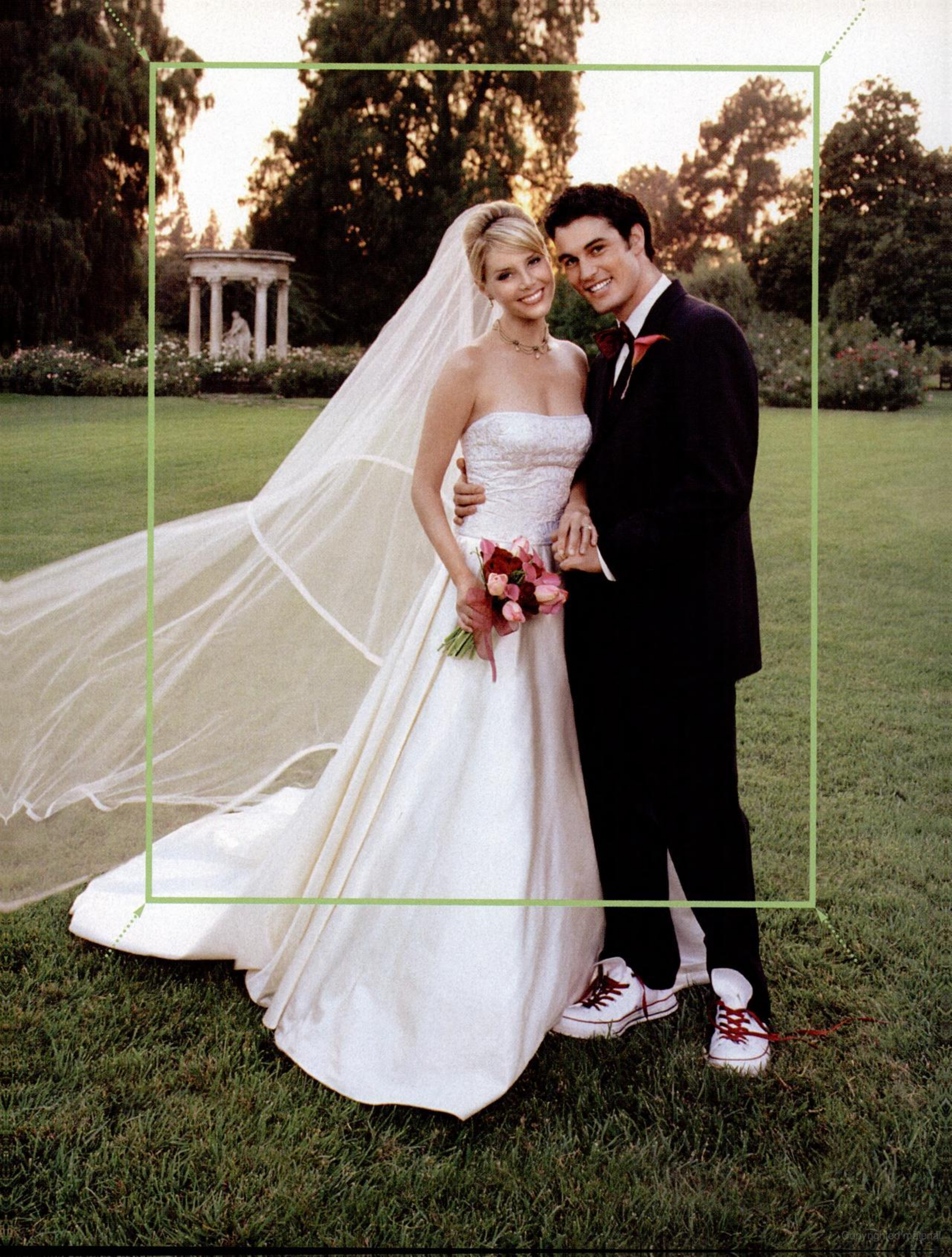
\$35, www.zalman.co.kr

Swiftech Northbridge Chipset Cooler

Almost all current motherboards come with a heatsink attached to the north bridge controller, but even this may be insufficient for keeping the chipset cool—especially if you overclock your system. Alleviate heat-induced exhaustion by adding an active cooling solution like the Swiftech MCX159 north bridge cooler. The MCX159 comes with a wide copper base and 96 aluminum alloy fins that rapidly disperse generated heat. The cherry on top: a near-silent 40mm Sunon fan that wicks away heat.

\$40, www.swifttech.com





Head2Head

A showdown among natural PC competitors

THIS MONTH: Superfast CPUs!

You didn't think AMD would let Intel hog the spotlight with its 3.4GHz Pentium 4 Extreme Edition, did you? The upstart chipmaker recently responded to Intel's 200MHz clock increase with its own 200MHz boost.

At 2.4GHz, the FX-53 is the highest-clocked processor AMD has ever introduced. It's also the company's first attempt to "retire" an older CPU. Once FX-53 hits stores, FX-51 versions of the chip will no longer be manufactured. Normally, Intel and AMD both continue to supply slower versions of chips when they introduce new ones.

We've been singing the praises of the Pentium 4 Extreme Edition for its superior performance in applications and gaming ever since Intel introduced the high-performance chip back in November. Naturally, we were

curious to see how the FX-53 stacks up.

To test the CPUs, we reached for the same set of benchmarks we used in our March showdown between the Prescott, Pentium 4 Extreme Edition, and Athlon 64 FX. We used the same hardware on both platforms: an ATI Radeon 9800 Pro card, a Western Digital WD2500JB hard drive, and Corsair Micro RAM. (We had to use registered RAM for the AMD CPUs because of the FX's current RAM requirements). Recognizing that CPU performance is influenced by a mobo's chipset, we used four different chipset combinations for our tests: VIA's K8T800 and nVidia's nForce3 150Pro for the FX-53, and Intel's 875P and VIA's PT880 for the P4EE.

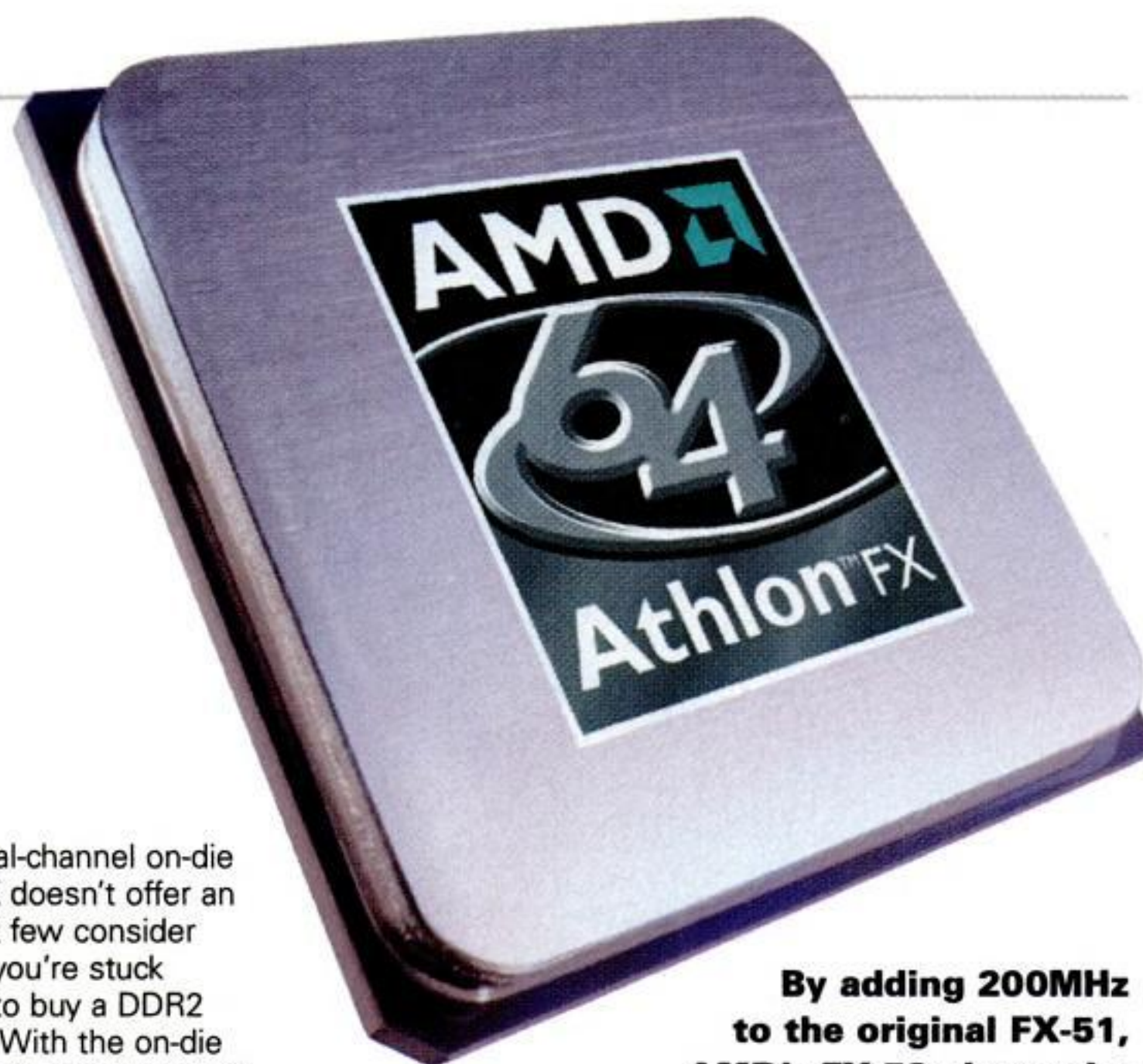
—GORDON MAH UNG

ATHLON 64 FX-53

Infrastructure: The 940-pin Athlon 64 FX board reminds us of the Athlon's early days, when you couldn't find a motherboard to match the CPU if your life depended on it. The situation isn't quite as dire as it was then, but it would be generous to say you have a healthy selection from which to choose. In fact, for the first three months of the CPU's life, there was only one board available. **Winner: Pentium 4 Extreme Edition**

Flexibility: No one argues that the dual-channel on-die memory controller in the Athlon 64 FX doesn't offer an incredible performance advantage, but few consider that this on-die controller also means you're stuck when you get the upgrade itch. Want to buy a DDR2 motherboard later this year? Forget it. With the on-die memory controller, the CPU is wed to the motherboard and RAM forever. Of course, some would argue that the days of milking three years of upgrades from a CPU or motherboard are long gone. Still, for maximum flexibility, the P4 platform is the only game in town. **Winner: P4 Extreme Edition**

Forward compatibility: In the year 2006, when the P4 is rotting away with the rest of your 32-bit software, FX owners will have one major upgrade remaining: a 64-bit OS for 64-bit games. Great 32-bit performance now and the promise of 64-bit computing in the future make this one a no-brainer. **Winner: Athlon 64 FX-53**



By adding 200MHz to the original FX-51, AMD's FX-53 closes the performance gap between Intel's new Pentium 4 Extreme Edition and the fastest AMD chip.

Application performance: Both CPUs are highly adept in applications. In some apps, such as Wolfram Research's *Mathematica*, the FX-53's floating-point performance slays the P4EE. But this advantage disappears in mainstream applications such as Adobe's *Premiere Pro*, *Photoshop 7*, and *MusicMatch*. That's no good, especially when you consider how many more people use these mainstream applications than the math-heavy apps the FX excels at. The FX-53 is just a skootch behind the P4 in *SYSmark 2004*, but the operative word is "behind." As in the gaming performance, our victor here emerges by the skin of its, er, silicon. **Winner: P4 Extreme Edition**

Game performance: The on-die memory controller typically gives the Athlon 64 FX a serious advantage in games. In our tests, we found it to be faster in *3DMark2001 SE* and *Unreal Tournament 2003*. But the P4EE ekes out some wins in *3DMark2003* and *Quake III* (the other games were pretty much a wash). This category is close—very close, in fact—but we give the edge to AMD. **Winner: Athlon 64 FX-53**

Price: At a bulk price of \$733, the FX-53 sure ain't an Athlon XP. However, that's still \$266 less than what Intel charges for the 3.4GHz P4 Extreme—when purchased in quantities of 1,000. Considering just how well the FX-53 performs and the fact that it's about 25 percent cheaper, this win easily goes in AMD's column. **Winner: Athlon 64 FX-53**

INTEL PENTIUM 4 EXTREME EDITION

Infrastructure: There are probably more motherboards for the Pentium 4 than there are varieties of toothpaste. From dual-channel, feature-crammed boards to budget single-channel types, you can find it all for the Pentium 4. Want colors or translucent fans? Extra plug-in power regulators? It's all here. **Winner: P4 Extreme Edition**



Application performance: The Pentium 4's days of being humbled in *Premiere* by CPUs with half the clock speed are over. Today the P4 is king of that benchmark. The margin closes with the introduction of the FX-53, but we still give the P4EE the edge in desktop applications. **Winner: P4 Extreme Edition**

Flexibility: What you give up in performance when the memory controller is embedded in the motherboard instead of the CPU, you gain in upgrades. Today's Extreme Edition, for example, could work in a Socket 478 motherboard that supports DDR2—that is, if someone makes it. Following this line of reasoning, you could take your old 2GHz 400MHz P4 that you got in an RDRAM system three years ago and plug it into a current DDR motherboard until you're able to afford a Pentium 4 Extreme Edition! You can run RDRAM, DDR, or even SDRAM if you want. **Winner: P4 Extreme Edition**

The Pentium 4 Extreme Edition has new company at the top: AMD's FX-53 all but erases Intel's performance advantage.

Game performance: Although the FX-53 (like the FX-51) is a fearsome performer in games, the P4EE did manage some wins of its own. In *Quake III*, the amazingly fast PT880/P4EE combo simply walked away from the competition. The 875P/P4EE combo also managed to edge the FX-53. Overall, however, it's not enough to declare the P4EE the faster processor for games. From our gaming experiences in other titles that don't feature benchmarks, we say the FX-53 is the winner by a slim margin. **Winner: Athlon 64 FX-53**

Forward compatibility: Flexibility is about what you can do now. Future-proof is about what you can do later. While there's nothing preventing a bold company from making a DDR2 board for Socket 478 CPUs, this doesn't mean it will happen. If the past is prologue, Intel and the rest of the pack will skip Socket 478 for the new Socket 775 interface due this summer. And then there's the 64-bit question, which isn't really a question at all with the 32-bit P4. **Winner: Athlon 64 FX-53**

	FX-53 VIA K8T800	FX-53 nForce3 150	P4EE i875P	P4EE PT880
SYSmark2004	193	183	196	193
Photoshop 7.0.1	266 sec	266 sec	254 sec	270 sec
Premiere Pro	678 sec	681 sec	515 sec	527 sec
Mathematica	504 sec	508.4 sec	607.7 sec	609.9 sec
MusicMatch 8.1	258 sec	259 sec	225 sec	225 sec
Comanche 8x6	73.89 fps	73.1 fps	74.22 fps	73.06 fps
AquaMark CPU	9,898	10,393	10,391	9,850
3DMark2001 SE	20,349	20,419	19,898	19,655
3DMark 2003 CPU	779	807	820	793
Jedi Academy 12x10	47.5 fps	41.3 fps	46.2 fps	46.3 fps
UT Flyby	321.9 fps	315.4 fps	293.5 fps	291.5 fps
QIII "Normal" 1.32	470 fps	444 fps	460 fps	498 fps

Best scores are bolded.

Price: We love a lot of things about the Pentium 4 Extreme Edition. We love the 2MB of cache. We love the Hyper-Threading. But we don't love the pricing. At \$999 a pop—assuming you buy 1,000 units—that's a serious chunk of change for a processor these days. Look at the benchmarks for the FX and then think about the price of the P4 EE. The win is obvious. **Winner: Athlon 64 FX-53**

THE UPSHOT

AMD's Athlon 64 FX-53 closes the slight gap the Pentium 4 Extreme Edition had over the FX-51. Both processors are exceedingly fast in disciplines they're strongly suited for: The Athlon 64 FX generally comes in first in gaming and floating-point applications, while the Pentium

4 Extreme Edition has the edge in productivity applications and multimedia apps. This one's tough, so the upshot is this: If you're budget-minded, take the FX-53; if not, treat yourself to the P4EE.



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Violence

Game experience may
change during online play.



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Say hello to **Beaglepuss**,
WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after... >AIPCS >Michael's Computers

Will the Real AIPCS Stand Up?

When AIPCS.com went offline, it seemed the system vendor was just another victim of the razor-thin margins the PC industry faces today. But the company's apparent death has left dozens of consumers in the lurch and raises sticky questions about the company's relationship with another system vendor.

People who visited AIPCS's web site earlier this year were greeted with the message: "Attention valued AIPCS customers: The contract from the manufacturer to resell the brand Artificial Intelligence was not extended this term. You may purchase directly from the original equipment manufacturer here. If you need to process a rebate, send a testimonial, or receive a claim rebate form please e-mail sales@aipcs.com. For any other questions, please e-mail sales@aipcs.com."

The goodbye message included a link to AIComputers.com where consumers could buy directly from the "OEM." (If you're not familiar with Artificial Intelligence Computers, you can read a review of one of its machines in the January 2004 issue of *Maximum PC*.)

anything at this point," Mouzakitis told the Dog. What exactly went wrong?

"AIPCS had a major data loss problem," Mouzakitis said. Much of the customer data was lost and that contributed to the consumer complaints. Mouzakitis said another problem AIPCS suffered was when consumers cancelled orders for custom-built systems at the last minute. Because AIPCS had to eat the cost of the parts that were ordered, some of that was passed along to consumers.

Many consumers, however, have a different take on what was going on with AIPCS. Consumers on multiple web forums say that after making down payments to finance computers through AIPCS.com, the machines were never delivered and customers were given the runaround for weeks. Other consumers say AIPCS told them their credit ratings had changed since they applied



AI Computers' owner says his company has nothing to do with defunct AIPCS.com.

with selling and refund practices as the second- and third-ranked issues.

So where does AIComputers.com fit into all this? Despite Mouzakitis statements to *Maximum PC* that "we're completely separate companies," consumers and even the Better Business Bureau seem to think otherwise. The BBB's complaint record shows that AIPCS.com was also doing business under AIComputers.com and Artificial Intelligence, Inc. Mouzakitis contends that the BBB's information is incorrect and that the BBB had agreed to update its report accordingly. At press time, however, the BBB hadn't changed anything.

Even more damning might be the fact that the two companies shared the same address. Mouzakitis said it's no secret that AIPCS.com rented space in the same building.

But some consumers tell of employees who answered the phones for both AIPCS.com and AIComputers. And in an e-mail exchange between *Maximum PC* and AI Computers, the e-mail came from the domain AIPCS.com. Mouzakitis has an explanation for that too. Lambros Ballas, the "facility supervisor" for AI Computers also helped out with AIPCS.com. Mouzakitis said the employee's e-mail was misconfigured and the domain should have been AIComputers.com, not AIPCS.com.

OK. But how does Mouzakitis explain his own name on the form AIPCS Systems Technologies Inc. filed with the state of New York to become a corporation? Mouzakitis' answer: "I helped out a lot of people here. I may have helped someone fill out the paper work, but it wasn't anything more than that."

One document Mouzakitis couldn't explain

AIPCS.COM HAS RACKED UP COMPLAINTS ON WWW.RESELLERRATINGS.COM AND NUMEROUS OTHER BULLETIN BOARDS, AND HAS EVEN INSPIRED A DEDICATED ANTI-AIPCS WEB SITE.

But consumers who say they were burned by AIPCS.com allege the two companies are one and the same. The Dog contacted Constantine Mouzakitis, the owner of Artificial Intelligence Computers. When asked to explain the relationship between AIPCS.com and AI Computers, Mouzakitis said the two are separate entities.

"(AIPCS and AI Computers) aren't the same," Mouzakitis told the Dog. AIPCS.com was nothing more than a reseller run by a former employee of AI Computers. Since AIPCS has apparently gone away, AI Computers has been trying to repay some of AIPCS' customers, he said.

"We're just trying to do the best by

for financing, and that they had to pay more to receive the computer. When consumers balked because they thought it was unreasonable or because they could not afford to pay more up front, they were told the deposits were not refundable.

Throughout its existence, AIPCS.com has racked up complaints on www.resellerratings.com and numerous other bulletin boards, and has even inspired a dedicated anti-AIPCS web site (www.geocities.com/noaipcs/Noaipcs2.html). The Better Business Bureau rates AIPCS.com as "unsatisfactory" and logged a whopping 130 complaints in the last 12 months. The bulk of the complaints were related to delivery problems,

was the application AI Computers completed to run ads in *Maximum PC* (in the interest of full disclosure, AI Computers continues to owe money to Future Networks USA, *Maximum PC*'s publisher, for those ads). The application states the name of the company as AIPCS Systems, with Artificial Intelligence as a DBA ("doing business as"). The form lists facility supervisor Lambros Ballas as the contact and identifies AIPCS.com as the company's URL.

The Dog asked Mouzakitis to supply the name of AIPCS' owner in order to interview him or her, but Mouzakitis declined. The Dog also requested that Mouzakitis supply documents that would prove the two companies are separate entities, but he has yet to comply.

Mouzakitis did insist that AIComputers was trying to help consumers left hanging by AIPCS.com, and that he and Ballas were paying "through the nose" to help consumers whose deposits haven't been returned.

The Dog isn't sure what the real story is, but would like to hear from consumers who are still owed cash by AIPCS.com. Woof.

Is This for Real?

DEAR DOG: I just found this web site that apparently sells computers that are so cutting-edge some of the components don't even exist yet. Some sort of anomaly in the space time continuum thingy. Who wouldn't like a 17,000 score in *3DMark2003*, which is what this web site's advertisements boast? (The highest *3DMark2003* score right now is around 7K.) The ads for these PCs also claim an overall noise level of 11dB (I wonder if anyone there even realizes that isn't possible except for maybe in a sound-proof chamber). The web site also mentions a 500GB hard drive (once again, doesn't exist), not to mention the FX-51 3400+ processor (A64 3400+ yes, FX-51 3400+ no). Hell, it even goes as far as to offer a FX-51 3400+ in a laptop. The web site is www.michaelscomputers.com.

—J. HOELLE

THE DOG RESPONDS: Many readers have written to the Dog about the seemingly fantastic PCs offered by Michael's Computers. And the outrageous *3DMark* scores aren't limited to desktop systems. For example, Michael's web site claims its MX54 laptop with a 3.2GHz Pentium 4 and Radeon 9600 Pro videocard can spit out 13,411 in *3DMark2003*. That's pretty remarkable when you consider that none of the souped-up notebooks in *Maximum PC*'s April roundup could break even half that score.

Even more amazing are the endorse-

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3DMark03 Average Score: **17,894** Average Frames Per Second: **788**
Intel P4 3.4GHz AMD 64-BIT FX-51 3400+ 16,895 Intel P4 3.4GHz AMD 64-BIT FX-51 3400+ 689

Process Securely Online with PayPal

MX8 runs ultra quiet at < 11dba (Absolute Stealth Silent)
Average Boot Time past post is 7.7 seconds
Average Loading Times of most software < 2 seconds

PREVIOUS NEXT

Michael's Computers claims a hard-to-believe *3DMark2003* score of 17,894 for its P4 box.

ments by *Maximum PC* magazine and Sharkyextreme.com that appear on Michael's site. The fact is, *Maximum PC* has never reviewed a product from Michael's Computers and the Dog was unable to find any such review in the SharkyExtreme archives.

When *Maximum PC* George Jones contacted Michael of Michael's Computers, he was told the magazine's logo was used to represent official approval of components used in the computers, not the machines themselves. This isn't the first time Michael's has done this. Almost a year ago, Gamersdepot.com asked Michael's to remove its GD Drool Award after the logo was used to advertise a machine that was never reviewed by Gamersdepot.com.

To be fair to Michael's, the rules for logo usage aren't totally understood by all vendors; indeed, the *Maximum PC* logo has been used by other companies in the same manner—referring to components in a machine.

Nonetheless, Hoelle's observations about the unbelievable benchmark scores—particularly the near 18,000 in *3DMark2003*—and nonexistent hard drives do merit some examination. It's unlikely that even next-generation hardware could achieve two-thirds that score.

At press time, Michael's Computer did not return phone calls or e-mail. And more disturbing, the direct phone number for Michael's Computers leads to a residence in Los Angeles, Calif. A woman who returned the Dog's phone calls had no knowledge of Michael's Computers and said she was just given the number two months before when she moved to the area. So Michael's Computer, where are you?

Interestingly, after Tom's Hardware (www.tomshardware.com) ran its own scathing exposé of the elusive company, Michaelscomputers.com suddenly became "unavailable". ■

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing watchdog@maximumpc.com. The Dog promises to get to as many letters as possible, but only has four paws to work with.



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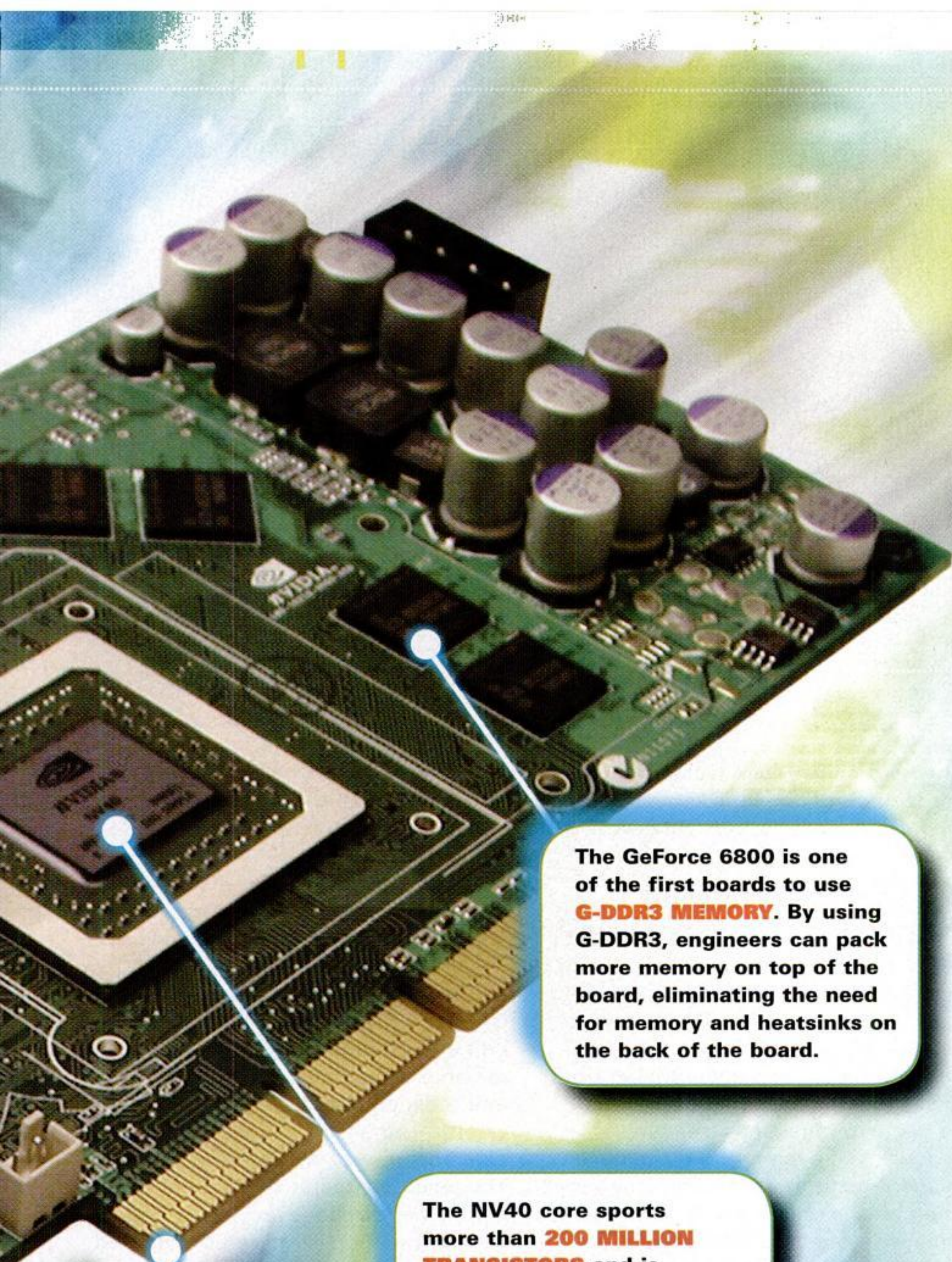


Game on!



**nVidia's
GeForce 6800
could usher in an
era of unprecedented
3D graphics and a
bold new generation
of games**

BY WILL SMITH



The GeForce 6800 is one of the first boards to use **G-DDR3 MEMORY**. By using G-DDR3, engineers can pack more memory on top of the board, eliminating the need for memory and heatsinks on the back of the board.

The NV40 core sports more than **200 MILLION TRANSISTORS** and is expected to run at more than **500MHZ**. For people keeping track at home, that's more transistors than a Pentium 4 Extreme Edition!

The initial version of the GeForce 6800 will be an **AGP CARD**, but later this year, nVidia will release **PCI EXPRESS** versions.

With **16 PIPELINES AND 32 SHADER UNITS**, the GeForce 6800 should have four to eight times the shading horsepower of the GeForce FX 5900. That's a whole lotta shading!

A gaping chasm the size of the Grand Canyon lies between minor and major mistakes. Accidentally backing over your garbage cans? Small mistake. Accidentally posting incriminating pictures of yourself on the FBI's message board? Big mistake. Upon its release last summer, NV3x, nVidia's most recent GPU core technology, definitely fell into the big mistake category.

With the GeForce FX 5800, the initial 3D card based on the NV3x core, nVidia was forced to overcompensate for a relatively puny 128-bit memory pipeline by cranking the core processor and memory clock speed so high (to an astonishing 500MHz/500MHz) that the series of cards required a boisterous two-slot cooling rig to dissipate the accumulated heat. The company's follow-up, the GeForce 5900, upgraded the memory pipe to 256-bits, but the card remained a loud-mouthed slot-hog.

Despite these flaws, the 5900's high clock speed made it a compelling choice for gamers. The high fill rates and awesome performance in games lacking pixel-shaders (more on this later) impressed us so much we chose it over ATI's Radeon 9800 Pro when we built our annual Maximum PC Dream Machine last summer.

Then came the *real* problem. During the second half of last year, as more and more games began to rely on programmable shaders—which add nuance to shadows and mapped surfaces for a more realistic look—major flaws in NV3x were exposed like a politician's shady exploits. Games that were bound by the performance of the programmable shader engine, like *Half-Life 2* and *Tomb Raider: Angel of Darkness*, ran at such low frame rates on nVidia hardware they were virtually unplayable. A set of rapidly deployed driver updates partially ameliorated the problem, but the underlying flaw in the NV3x architecture had been laid bare for all the world to see.

But, in the words of S.E. Hinton, that was then, and this is now. On the eve of the GeForce 6800's release, nVidia feels confident that NV40, the company's brand-new graphics hardware, will atone for the flaws of its for-bearer with dazzling 3D performance that will offer unprecedented levels of visual quality in the upcoming batch of games.

As usual, *Maximum PC* has the scoop, and we're ready to talk. Read on to find out about nVidia's brand-new 3D card, how the company fixed the NV30's flaws, and what the near and far future hold. We also mined some interesting rumors from nVidia's chief competitor, ATI. The Toronto-based 3D graphics company has an interesting next-gen chip, code-named R420, of its own in development.

And finally, this wouldn't be a 3D story without a special preview of the 10 best-looking games of the second half of 2004. Heck, we've even taken a crack at analyzing what hardware specs you'll need to get kick-ass frame rates from these titles.

Well, what are you waiting for? It's game on!

Inside the GeForce 6800

The GeForce 6800 will be the first video-card on the market powered by nVidia's new NV40 hardware. What exactly will a 6800 deliver in terms of performance and visual quality that a current Radeon 9800 XT won't? An nVidia source gave us the full deets on the card's capabilities and boy-oh-boy howdy, does this videocard look promising—and powerful.

Pixel Pipeline Pleasure

The biggest enhancement in NV40 is an increased number of pixel pipelines. Each pixel that's drawn on your screen passes through a pipeline, which in most cases, processes a single pixel every clock cycle, although more complex effects sometimes require multiple passes through the pipeline. Pixel pipeline performance is the bottleneck for most 3D applications.

SPECIFICATIONS

Number of transistors
200 million

Core clock
500-600MHz

Memory clock
600MHz

Memory type
256-bit G-DDR3

With this in mind, the GeForce 6800 should exhibit better performance than its predecessors and the competition, because nVidia has equipped the NV40 with an astonishing 16 pipelines.

That's double the number of pipelines in ATI's Radeon 9800, and four times the number of pipelines in the GeForce FX 5950. Note that these aren't theoretical pipelines that only work in certain circumstances—each one is available at all times and is usable by any 3D application or game.

Increasing the number of pipelines is the easiest way to increase performance of a 3D GPU, and while we won't know exactly how much of a speed boost this massive increase will yield until we do in-depth testing, gains should be significant.



Hellspawn spider zombies got you down? As the zombies in *Doom 3* gnaw on your flesh, you can take some small comfort in the fact that everything in the game casts realistic, soft shadows courtesy of *Doom 3*'s shadow volumes.

Will the Second Slim Shader Please Stand Up?

Shader programs are small snippets of specialized code run on 3D objects within the graphics pipeline. Programmers use these bits of code to meticulously define graphical elements ranging from the shape and movement of objects in a game to reflections, refractions, shadows, and even fog. Most games use multi-texturing to blend many rendering effects onto a single pixel that's displayed onscreen. For example, a game might blend the base texture, a normal map (to add irregularity to the surface), a specular highlight (to add shine), a reflection map, and several lighting effects (to add shadows and bright spots) to one pixel. By running these shader programs on the millions of pixels on screen at any given time, games can render the world in a more lifelike manner.

Eventually, even the base color of objects in games will be defined by dynamic shader programs instead of static textures created in *Photoshop*. Right now, however, programmatically generating a texture with a shader program is less efficient than simply creating a texture map and then running simpler shaders on it. Today's videocards just don't have the muscle to programmatically generate the thousands of different textures in a scene. But as videocard

technology advances, the efficiency of pixel shading will as well. In fact, with NV40, the shift is already beginning.

Currently available programmable cards, like the Radeon 9800 and GeForce FX 5700, sport a single shader unit in each pipeline. But the NV40 ups the ante by adding a second shader unit to its pipelines. This means NV40 can run two shader programs on every pixel that passes through the pipeline. The result is greater visual clarity and a hefty performance increase over last-generation NV30 parts, which suffered huge performance losses in games designed to use pixel shaders.

PCI Express at What Cost?

In another intriguing move, nVidia plans to release PCI Express versions of its next-gen graphics technology. The GeForce 6800 will debut as an 8x AGP part, but later this year, nVidia will also release a PCI Express version named NV45. PCI Express is the replacement for today's PCI and AGP buses. 16x PCI Express, the spec chosen for contemporary graphics cards, provides 4GB/s of bandwidth between the CPU and videocard, which is nearly double the bandwidth of AGP 8x. More importantly, however, the PCI Express connection allows data to flow in both directions at the same time at full speed.



3D FUN FACTS: The Bonnie and Clyde from Jazz Multimedia wasn't just another Rendition V2200-based videocard. It actually sported both AGP and PCI connectors on the same card! We're not saying it's a bad idea, but no one else has ever done it...



This dapper vampire from *Vampire the Masquerade: Bloodlines* is excited about shaders too! Without shaders, the fur on his coat would look flat and lifeless. With the power of shaders, it's pimp!

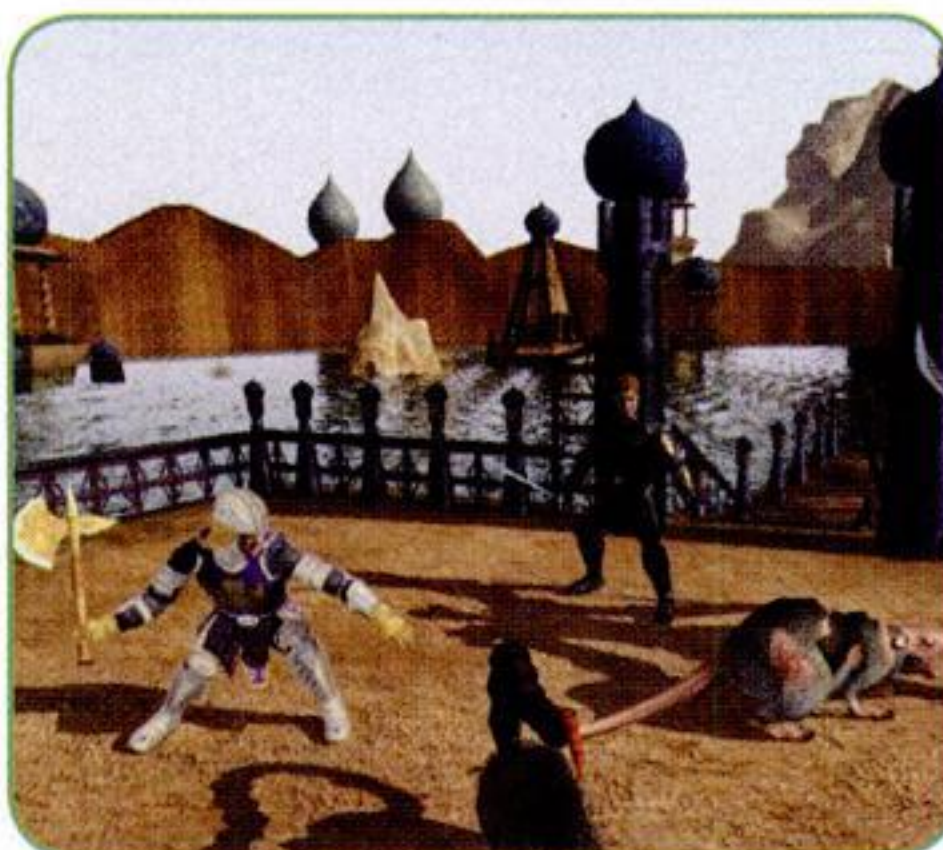
With AGP 8x, the connection from the graphics card to the CPU is limited to a puny 256MB/s. This isn't much of a problem for gaming or 3D applications because most data transfers in these apps travel from the CPU to the video-card, but it's a serious bottleneck for video editing, where large amounts of data travel from the CPU to the videocard and vice versa.

The potential problem for NV45 is that it's not a native PCI Express part. The silicon necessary to talk to the high-speed PCI Express bus isn't integrated into the NV45 GPU itself; instead, nVidia uses a bridge chip. nVidia claims the bridge—dubbed the high speed interconnect (HSI)—is equivalent to a fully bidirectional AGP 16x connection and will perform no worse than a native PCI Express graphics card.

Frankly, we're skeptical of claims that no performance degradation will result from using the bridge instead of a native solution. It just doesn't jibe with our experiences with other bridge technologies. Rest assured that when we get the first HSI-powered boards in our lab, we'll perform extensive tests.

The GeForce 6800 Countdown Begins

So when can you expect to see nVidia's new boards on shelves? Our sources tell us the GeForce 6800 will be available



Reflective water, armor, and weapons are a cinch when you can harness the power of programmable shaders.

for retail sometime in early June. The 6800 is the AGP version of the NV40, and will probably include 256MB of fast G-DDR3 memory running at 600MHz or more. Keep in mind, however, that much like 3D games themselves, nothing is set in stone; nVidia has slipped on release dates *and* estimated clock speeds in the past.

We expect to have a reviewable GeForce 6800 in the *Maximum PC* lab next month. That's when we'll get under the hood, torture test it, and see how it *really* performs. Only then will we know for sure if nVidia has truly redeemed itself in the world of pixel shaders.

Why NV30 Suffered from Shoddy Shader Performance

The NV30's deep pipeline let nVidia crank up the clock rates, but the hardware's clunky reaction to poorly optimized code was less than ideal. Running code through a deep pipeline is efficient only if the instructions for pixel-shading operations are written to take full advantage of the architecture.

Say, for example, a shader program needs to perform two texture reads and two blend operations. The NV30 runs much faster if the ops are sent through the pipeline in the order "texture, texture, blend, blend" rather than "texture, blend, texture, blend." While the resulting render is exactly the same regardless of the order of operations, the first example is more efficient, allowing all four operations to run through the pipeline in one shot, and all four instructions completed in a single cycle. If the shader ops are sent through the pipeline in the other order, the shader program will get kicked out of the pipeline after every op, and will take a whopping four clock cycles to complete all four ops. Because these operations need to run on thousands of pixels in your game, the longer these operations take to complete, the slower your game runs.

In NV40, nVidia is ditching the deep pipeline and long word instruction set of NV30 for a hybrid scheme known as SIMD/MIMD. SIMD stands for *same instruction, multiple data*, which means the program sends one set of instructions to the GPU, then runs those instructions on many different data sets. MIMD stands for *multiple instructions, multiple data*. MIMD is a fancy way of saying the NV40 is a parallel processor; in other words, each pipeline can run different instructions on different data sets at the same time.

The upshot of this improvement: increased 3D performance, which means faster frame rates, and eventually better-looking games as 3D programmers learn to take advantage of the technology.



Although the ATI Rage and S3 Virge were the first 3D videocards ever released, they were so slow in 3D apps they were dubbed "3D Decelerators." In *Maximum PC's* eyes, the first true 3D accelerator was the Rendition Verite V1000, released circa 1996.

WHAT'S NEXT FOR ATI?

We scope out ATI's next-gen GPU, code-named R420

At press time, ATI was taking a top-secret approach to its next-generation graphics processor, but we managed to gather some solid information about the company's highly anticipated counterpart to nVidia's NV40. Here's what we know.

First, the new 3D part is code-named R420, which is interesting in itself because R400 and R410 never existed. We expect R420 to be an updated 0.13-micron version of the R360 core that powered the Radeon 9800 XT. Moving to the smaller 0.13-micron process should allow ATI to crank up the clock speed in R420 to unprecedented levels—shoot, we've reached clock speeds nearing 600MHz with a 0.13-micron Radeon 9600. While we expect to see some minor new features, we'd be surprised if ATI incorporates any major changes other than the move to a smaller process.

We've also received reliable reports that R420 will not support Pixel Shader 3.0 and Vertex Shader 3.0, and that it will be limited to 24-bit floating-point color throughout its pipeline (the NV40 supports 32-bit floating-point). While R420 will still run Pixel and Vertex Shader 2.0 code, without 3.0 support for code loops and branches, developers will have to break long Pixel Shader 3.0 shader programs into small, easily digestible chunks that will run on the R420. This will absorb clock cycles and could seriously affect performance in games that use more sophisticated programmable pixel shaders.

The real key here is how quickly developers begin switching to the new 3.0 spec. The migration rate will determine how big an impact these missing features have on gaming performance. It took almost two years before we saw the first games that actually used Pixel Shader 2.0—it could take just as long for Pixel Shader 3.0 games to hit store shelves.

Test Your Graphics IQ

Think you know it all? Answer these five questions to find out what you know (and don't know) about 3D rendering technology.

1) Anti-aliasing technology:

- A. Smooths out the jagged edges of models in-game.
- B. Perspective corrects textures that stretch into the distance.
- C. Works its mojo by blending several adjoining pixels.
- D. Both a and c.

2) Volumetric fog can be:

- A. Patchy.
- B. Transparent.
- C. Purple.
- D. All of the above.



3) What's wrong with this picture?

- A. Anti-aliasing is disabled. There are jaggies everywhere!
- B. The videocard's flux capacitor is out of alignment.
- C. Trilinear filtering is not enabled. Transitions between mip-maps are evident.
- D. Bilinear and anisotropic filtering are enabled. It's texture madness!

4) The main benefit of switching from 32-bit integer color to 32-bit floating-point color is:

- A. Floating-point math runs faster than integer math on current hardware, so games will be faster.
- B. 32-bit floating-point numbers can describe a much wider range of colors and brightness values.
- C. 32-bit integers sink instead of float.
- D. There is no benefit to rendering with 32-bit floating-point numbers.

5) Normal maps are better than bump maps because:

- A. Bump maps actually deform the model's geometry, so they're indistinguishable from normal maps.
- B. Bump mapping surfaces makes them abnormal. Normal mapping just makes them more normal.
- C. Normal mapped objects cast correct shadows and properly collide with other objects in games.
- D. Both a and c.

And now, the moment you've all been waiting for...

ANSWERS: 1-d, 2-d, 3-c, 4-b, 5-c



Experts predict that videocard frame buffers are going to grow larger at an astounding rate. By the end of this decade, we could see videocards with 2GB of onboard memory!

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The Top 10 3D Games of 2004

The second half of the year will bring some of the most anticipated PC games of all time, and we can't wait! The only

question is: Can your computer cope? Our experts put forth their best estimate as to what kind of PC horsepower you'll

need to run these games at optimum levels—that means high resolutions with the detail cranked up.

Doom 3

We've talked about id Software's upcoming magnum opus ad nauseam, and there's a reason for that: Thrills and chills aside, *Doom 3*'s engine represents a revolution in the way PC games look. With a truly dynamic lighting system, hyper-realistic stencil shadows, and character models created from movie studio quality originals, *Doom 3* is guaranteed to push your PC beyond the limit. While the game's story hasn't changed much since the original ground-breaking first-person shooter—you're a space marine charged with investigating a space station mishap—the game's combination of visual quality and unbelievably creepy monsters has us drooling in anticipation.

DEVELOPER: ID **PUBLISHER:** ACTIVISION
RELEASE DATE: WHEN IT'S DONE



SYSTEM SPECS

CPU: 3GHz+/FX-51
VIDEOCARD: ATI Radeon 9700+, nVidia GeForce FX 5900+
MEMORY: 2GB

Half-Life 2

Another game we've all heard a lot about. Unfortunately, lately, all the talk has been

negative—stolen code, release delays, and more release delays. We expect that to change soon. *Half-Life 2* features a realistic lighting model and neat-o dynamic shadows, but we're most excited to see normal maps on nearly every object. Normal maps are used to deform the geometry of a model; they can be used to add everything from window sills to wrinkles on a character's face. This will easily be one of the best-looking titles of the year.

DEVELOPER: VALVE **PUBLISHER:** VIVENDI **RELEASE DATE:** NOV 2004

SYSTEM SPECS

CPU: 2.5GHz
VIDEOCARD: ATI Radeon 9700+, nVidia GeForce 6800+
MEMORY: 1GB

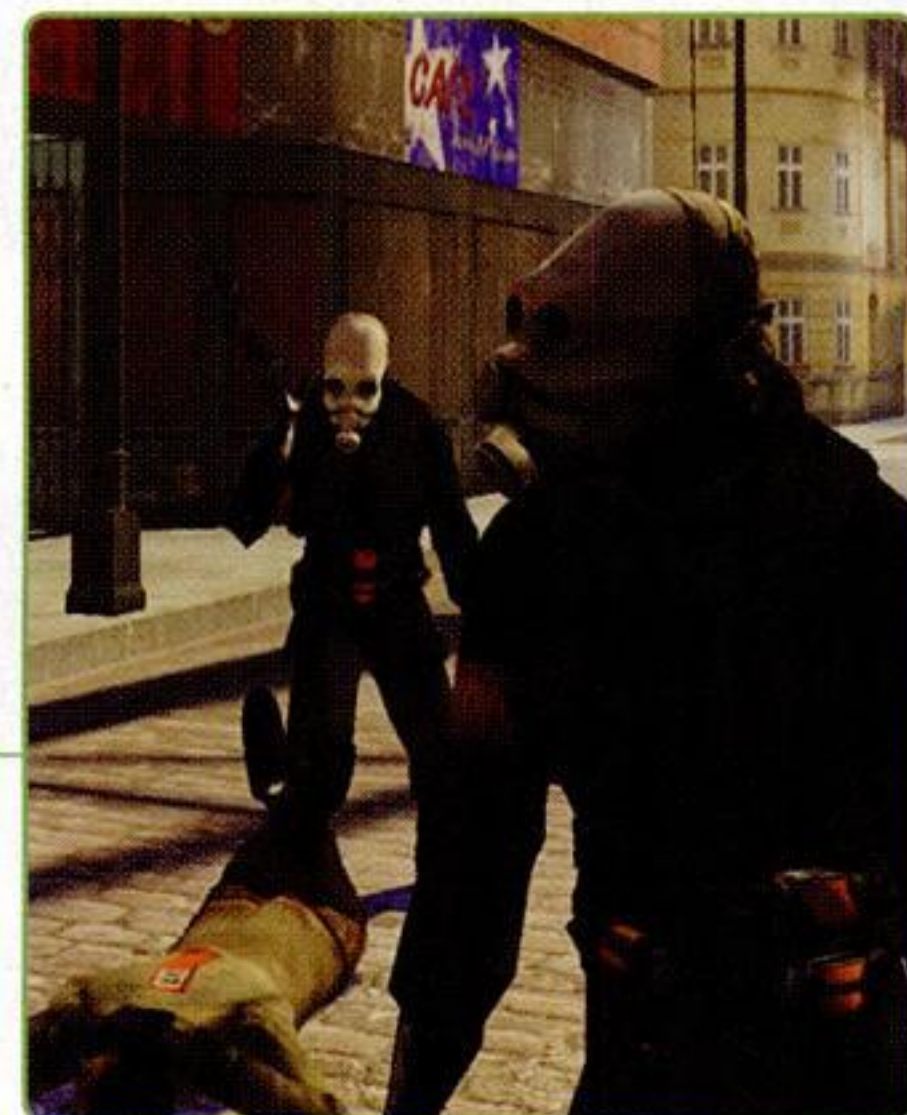
Far Cry

Far Cry arrived just as this story went to press, but we'd be remiss not to mention it. Take a bright, airy tropical archipelago—that's a chain of small islands—and add a truck-load of guns, a seemingly endless horde of mercenaries, and a few fun vehicles, and you've got a good time. Stay tuned for the full review in next month's issue.

DEVELOPER: CRYTEK
PUBLISHER: UBISOFT
RELEASE DATE: NOW

SYSTEM SPECS

CPU: 3GHz+/FX-51
VIDEOCARD: ATI Radeon 9800+, nVidia GeForce FX 5900+
MEMORY: 1GB



Lord of the Rings: Battle for Middle Earth

This one's simple. Take one part *Lord of the Rings*, add a little real-time strategy sauce, and bake them together with the *Command & Conquer: Generals* development team. Now that's a recipe for one hell of a good lookin' blockbuster. *Battle for Middle Earth* puts you in command of either the forces of light or Sauron's goons in all the major battles from the *Lord of the Rings* trilogy. Pay close attention for the massive orc onslaughts at Helm's Deep and Minas Tirith.

DEVELOPER: EALA **PUBLISHER:** ELECTRONIC ARTS **RELEASE DATE:** HOLIDAY 2004

SYSTEM SPECS

CPU: 2.5GHz
VIDEOCARD: ATI Radeon 9500+ or nVidia GeForce FX 5700+
MEMORY: 1GB



The average enemy model in Quake consisted of between 350 and 500 polygons. The final in-game models in *Doom 3* have between 2000 and 6000 polygons, plus normal maps. Did you know there are only about 137,000 hippopotamuses left in Africa?

Unreal Tournament 2004

5 Yeah, yeah, we've been playing the demo for months now, and you probably have been too. *UT2004* is a game poised to kick ass up, down, left, and right. Recently released, this first-person shooter allows you to play online or against a highly sophisticated set of AI bots. It includes 40 new maps, three new weapons, two new gameplay types, and voice communication for improved team tactics. Visually, *UT* sports a dynamic lighting system, bump maps on every object, and a realistic physics model that actually lets you feel the recoil when you shoot.

DEVELOPER: EPIC **PUBLISHER:** ATARI **RELEASE DATE:** NOW

SYSTEM SPECS

CPU: 2.5GHz
VIDEOCARD: ATI Radeon 9700+ or nVidia GeForce FX 5900+
MEMORY: 1GB

Rome: Total War

6 Command massive legions of Roman soldiers as you battle the barbarian hordes in this tactical strategy game that Activision promises to be easily understood by both newbies and hardcore gamers alike. What exactly is a massive legion? Well, take a look at this screenshot. Our intern counted about 22,148 troops in this one shot (we had him count twice to be sure).

DEVELOPER: CREATIVE ASSEMBLY

PUBLISHER: ACTIVISION **RELEASE DATE:** SEPT

SYSTEM SPECS

CPU: 2.5GHz
VIDEOCARD: ATI Radeon 9500+ or nVidia GeForce FX 5700+
MEMORY: 1GB



Lineage II

7 Let's face it: Most massively multiplayer online games look like crap. *Lineage II* is a major exception. In this *Dungeons & Dragons*-style RPG, you'll defend monolithic castles from marauders and ride astride massive dragons as you smite your enemies. What really sets the gameplay apart, however, is its promise to demand more tactical thought than current MMOs.

DEVELOPER: NCSOFT **PUBLISHER:** NCSOFT

RELEASE DATE: MAY 2004

SYSTEM SPECS

CPU: 3.5GHz+/FX-51
VIDEOCARD: ATI Radeon 9800+ or nVidia GeForce FX 5900
MEMORY: 2GB

Vampire the Masquerade: Bloodlines

8 This upcoming action-oriented RPG, which casts you as a vampire in the modern day, shares something special with *Half-Life 2*. No, Gordon Freeman isn't a vampire—both games are powered by Valve's Source engine. This means you can expect to hunt your mortal prey in a dynamically lit, shader-intensive world. You want the shadows you lurk in to be dynamic and soft-edged, don't you?

DEVELOPER: TROIKA GAMES

PUBLISHER: ACTIVISION

RELEASE DATE: NOV 2004

SYSTEM SPECS

CPU: 2.5GHz
VIDEOCARD: ATI Radeon 9700+, nVidia GeForce 6800+
MEMORY: 1GB



Dungeon Siege II

10 We loved the first *Dungeon Siege*'s fast-paced, *Diablo*-style play, but it certainly wasn't a showcase for PC graphics. This sequel is a whole other story; when we saw the first live footage, we slobbered like hungry dogs. This hack-'n'-slash

S.T.A.L.K.E.R.: Shadow of Chernobyl

9 *S.T.A.L.K.E.R.*'s astounding near photo-realistic graphics, lifelike physics model, and unique setting make it a must play for any first-person shooter enthusiast.

S.T.A.L.K.E.R. is set in the so-called Chernobyl Exclusion Zone, the contaminated area surrounding the site of the world's worst nuclear accident. Interestingly, the developers made several trips into this forbidden radioactive area so they could more accurately render the abandoned cities and buildings in the 30km area.

DEVELOPER: GSC GAMEWORLD

PUBLISHER: THQ **RELEASE DATE:** SEPT 2004



SYSTEM SPECS

CPU: 3GHz+/FX-51
VIDEOCARD: ATI Radeon 9800+ or nVidia 6800+
MEMORY: 1GB

SYSTEM SPECS

CPU: 3GHz+/FX-51
VIDEOCARD: ATI Radeon 9800+, nVidia GeForce 6800+
MEMORY: 2GB

lite role-playing game looks so good that one editor—we'll call him L.D. to protect his rep—insists the movie we saw was actually a pre-rendered cinematic. What impressed us so? Dragons the size of cities, world-shattering spell effects, and cinematic scenes worthy of Peter Jackson. Oh yeah, there's real-time lighting too.

DEVELOPER: GAS POWERED GAMES

PUBLISHER: MICROSOFT

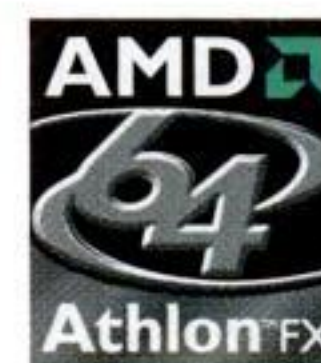
RELEASE DATE: HOLIDAY 2004



Microsoft's ill-fated foray into the 3D graphics arena was dubbed Talisman. Although the chip was theoretically capable of incredible performance, in real-world applications, it lagged behind commercially available chips, and the project was scrapped.

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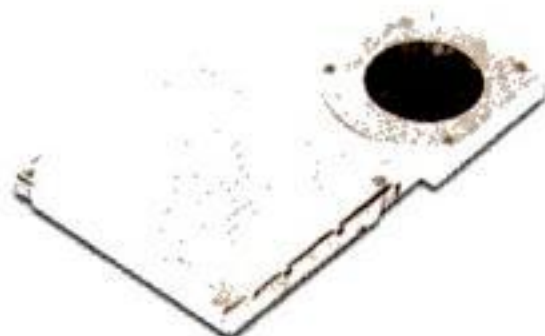
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Every year the staff of *Maximum PC* builds a weapon of mass benchmark destruction known as the Dream Machine. It's a PC so powerful we have to check with the controller of the state's electrical grid before booting, just to make sure there's enough juice in the pipelines to run the rig at full tilt. Remember the California "energy crisis" back in 2000? That was our dual P-III rig with four optical drives and six case fans running a *Photoshop* benchmark. Sorry about that.

But building the world's most audacious and lust-worthy PC isn't the biggest challenge we face in our jobs. Indeed, it pales compared with the arduous task of constructing the Dream Machine's budget-oriented baby brother, the Lean Machine. With the Dream Machine there are no holds barred, the sky's the limit when it comes to cost and components. With the Lean Machine our hands are tied by a budget of \$1,500.

Yet as difficult as that is, we're pushing the envelope and building not one, but *three* Lean Meanies with budgets of \$500, \$1,000, and \$1,500, respectively.

Lest you doubt the gravity of this undertaking, know this: Simply choosing

the parts sparked an office debate so intense and long-lasting, half the staff retreated beneath their headphones and editor Jones was forced to call several time-outs and send each of us to separate corners of the lab. Once a deal was finally hammered out, we ventured into the "real world" and purchased most of the parts with our own money. Next, we built the systems and ran them through our standard desktop benchmark suite. Finally, we compared them with each other, with our AMD FX51-based zero-point system, and with a \$620 eMachine to see how hand-built stacks up against OEM handiwork. We did all this experimentation just to find out how much PC you can get on a budget.

Follow along as we examine each of the PC's components in detail. The results may surprise you.



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LEAN MACHINE³

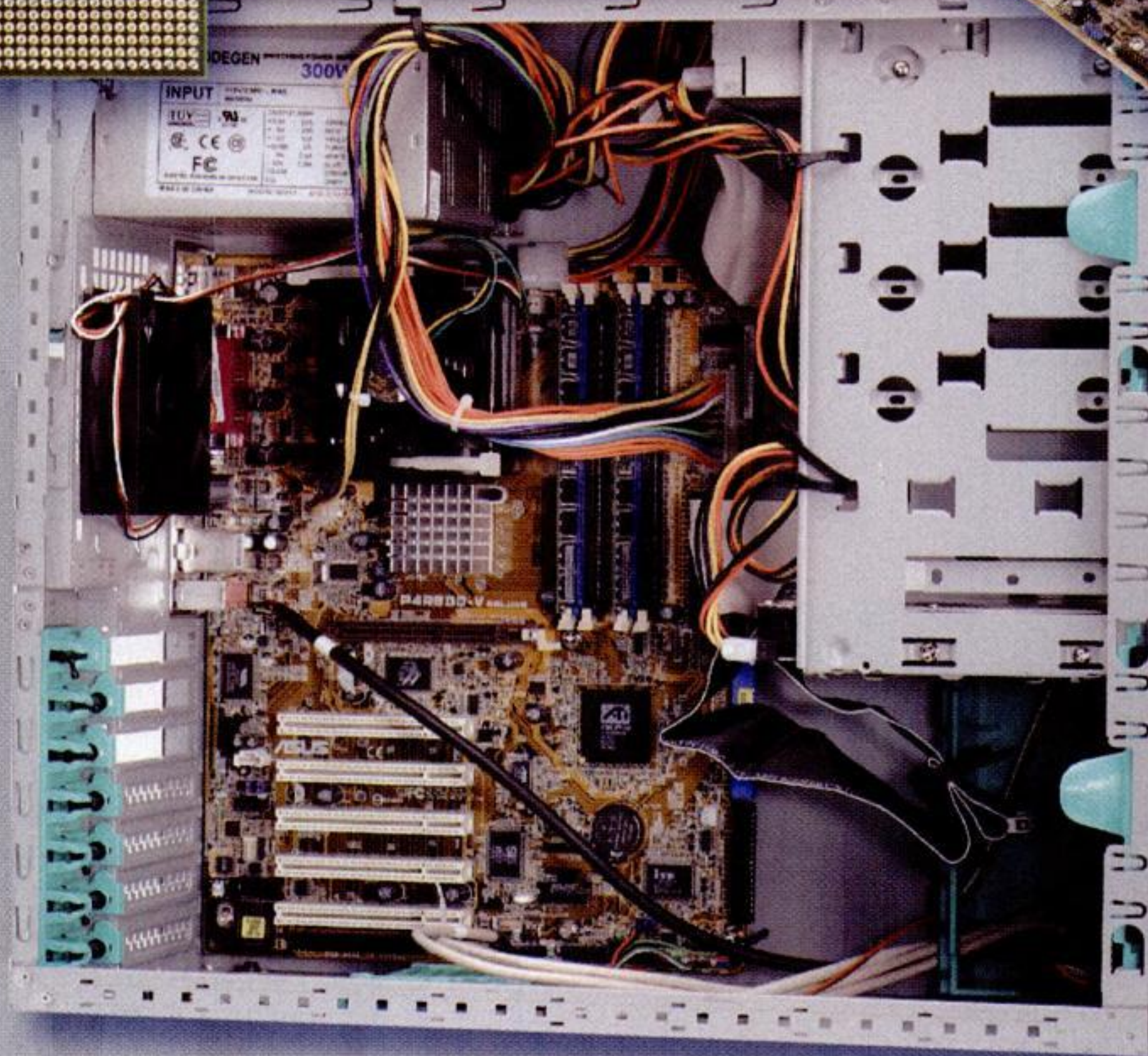
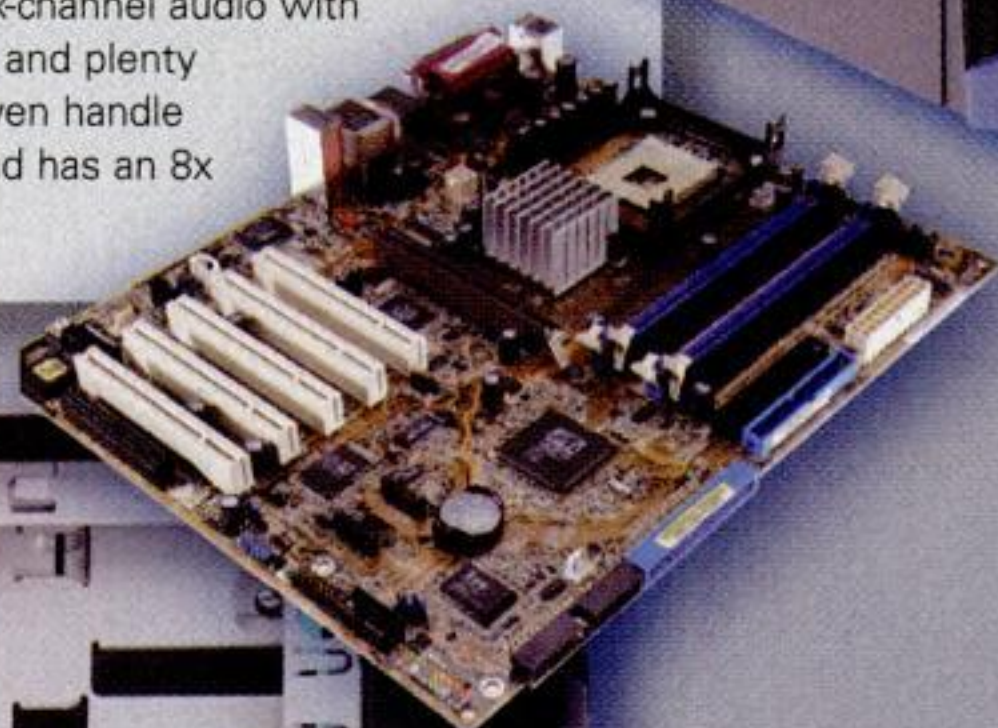
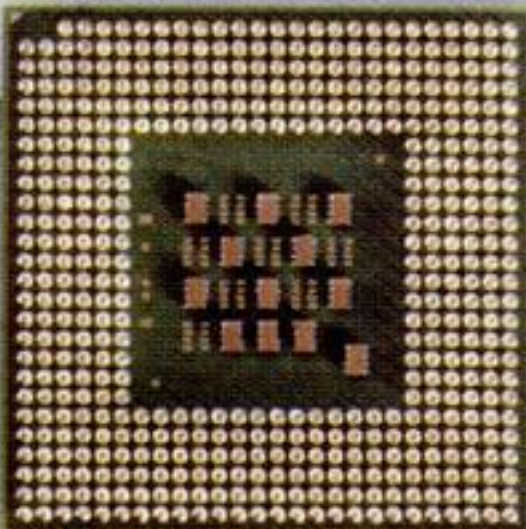
\$500 BABY BOOMER

CPU: INTEL CELERON 2.7GHz

This was a tough call. We vacillated between the 2.7-gig Celly and a straightforward P4 at 1.9GHz. Ultimately, clock speed and fear of the unknown trumped all other concerns. By going with a Socket 478 Celeron, we not only get the faster CPU, but we leave the door open to a P4 in the future.

MOBO: ASUS P4R800-V DELUXE

This Asus motherboard has everything we could want in a mobo. It employs ATI's 9100 IGP chipset, which boasts SATA RAID, FireWire, dual-channel memory support, onboard graphics, six-channel audio with SPDIF-out, six USB 2.0 ports, and plenty of upgrade potential. It can even handle Intel's new Prescott CPUs, and has an 8x AGP slot to boot.



HARD DRIVE: WESTERN DIGITAL 800JB

It's funny how PC hardware depreciates so rapidly that yesterday's drive du jour is now today's drive du budget. The 800JB is just an 80-gigger, but it sports a huge 8MB cache and spins its platters at a zippy 7,200rpm.

RAM: GENERIC PC3200 DDR

We were so squeamish about the generic memory modules we chose for the Baby Boomer, we considered wearing latex gloves before handling them. But in the end, these "VALU-RAM" DIMMs performed admirably.

OPTICAL DRIVE: LITE-ON 40X CD-RW

We were *this* close to using an old-school CD-ROM drive because we blew all our money on the motherboard, but Lite-On came to the rescue with its no-frills 40x CD-RW.

CASE: CHENBRO GAMING BOMB

For just \$45 the Bomb offers cooling-options galore in both the front and rear of the case, a tool-less design, a sexy case window, a well-designed front I/O port, and sturdy construction.

VIDEOCARD: ONBOARD RADEON GRAPHICS

Graphics duties are taken care of by the onboard chip, which is comparable to a Radeon 9200 or thereabouts. It offers DirectX 8 support as well as Pixel Shader 1.4 functionality, so it plays all today's games (albeit very slowly). It uses system memory for its frame buffer, which can be adjusted from 8MB to 128MB in the BIOS.

\$500 PC SPECS

BABY BOOMER	COST
Intel Celeron 2.7GHz	\$100
P4R800-V Deluxe	\$110
512MB (2x 256MB) PC3200 Generic	\$50
Chenbro Gaming Bomb	\$45
Generic 350W PSU	\$10
80GB WD 7,200rpm Special Edition	\$55
Lite-On 40x CD-R/RW	\$30
80mm case fan	\$5
WinXP Home OEM	\$95
TOTAL	\$500

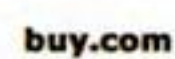
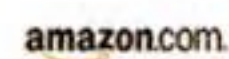


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LEAN MACHINE³

\$1,000 MIDRANGE MONSTER

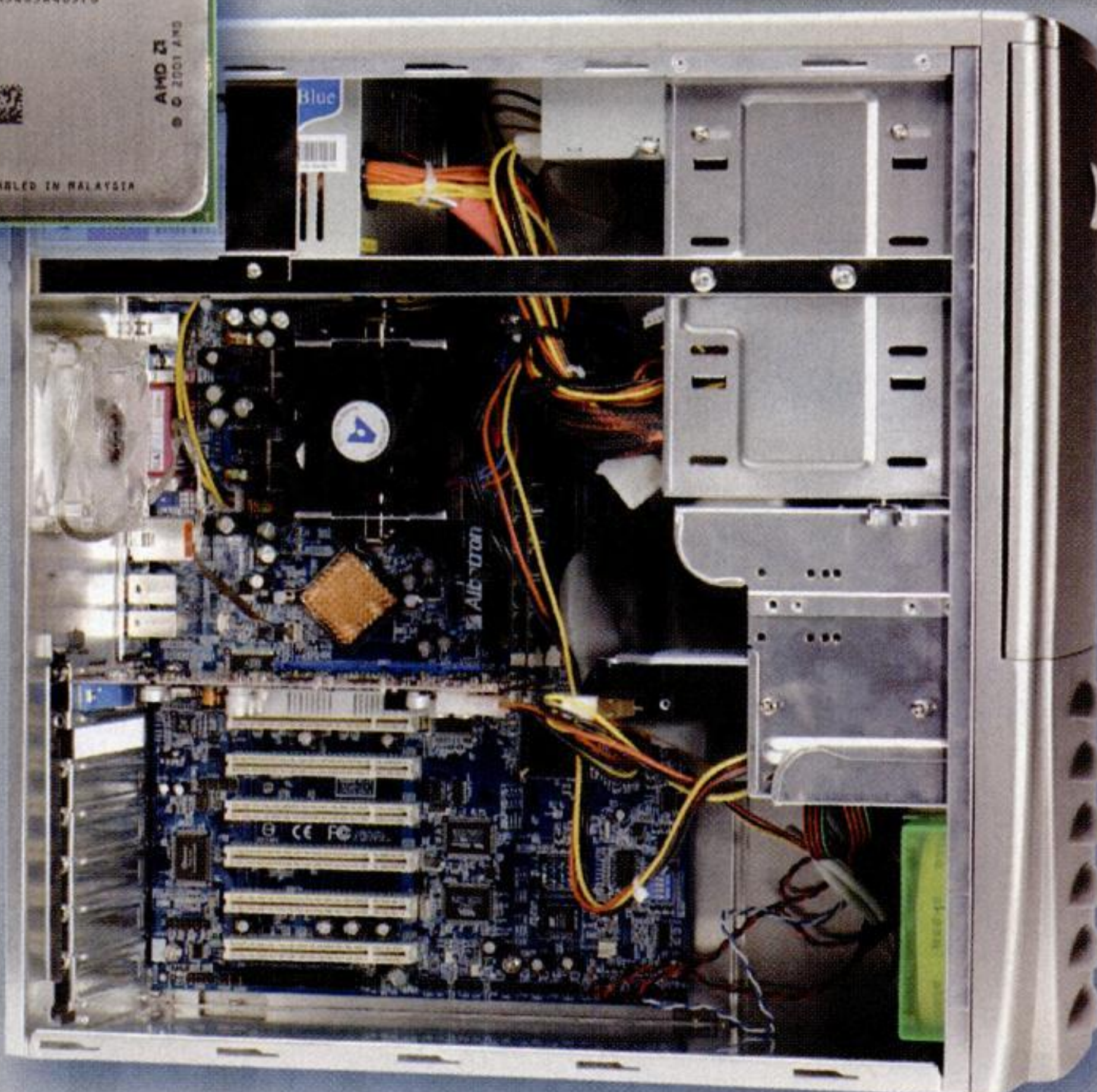
CPU: ATHLON 64 3000

Our decision to equip the midrange system with the budget-version Athlon 64 was met with zero resistance from anyone on staff. Simply put, it's a stupendous value. Some of our benchmarks don't favor AMD silicon, so its scores are not as impressive in comparison with the Intel-based machines, but when compared with a full-blown FX-51 CPU the non-FX CPU holds it own and costs just a third of the price.



MOBO: ALBATRON K8X800 PRO II

The Albatron mobo is our favorite non-FX motherboard in the Athlon world. Let's check off its goodies: Gigabit Ethernet, onboard SATA RAID, onboard pseudo 24-bit audio, FireWire, and six freaking PCI slots. We did experience one minor issue in testing: The mobo was unable to recognize a USB key even though it uses a USB keyboard and mouse.



HARD DRIVE: SEAGATE 200GB 8MB ST3200822A

Not surprisingly, our midrange hard drive is a balance between all-out power and ample capacity. Seagate's parallel ATA drive covers all the bases by having an 8MB buffer, 200GB of storage, and a rotational speed of 7,200rpm.

CASE: ANTEC LANBOY

By now, our love affair with the Lanboy is an open secret. We've fallen hard for this super-affordable case that offers all the necessary features. The Lanboy is small, light, and easy to move around, yet still sports a 480W Antec power supply, a case window, plenty of drive bays, and a clean, tidy interior. Color us smitten.

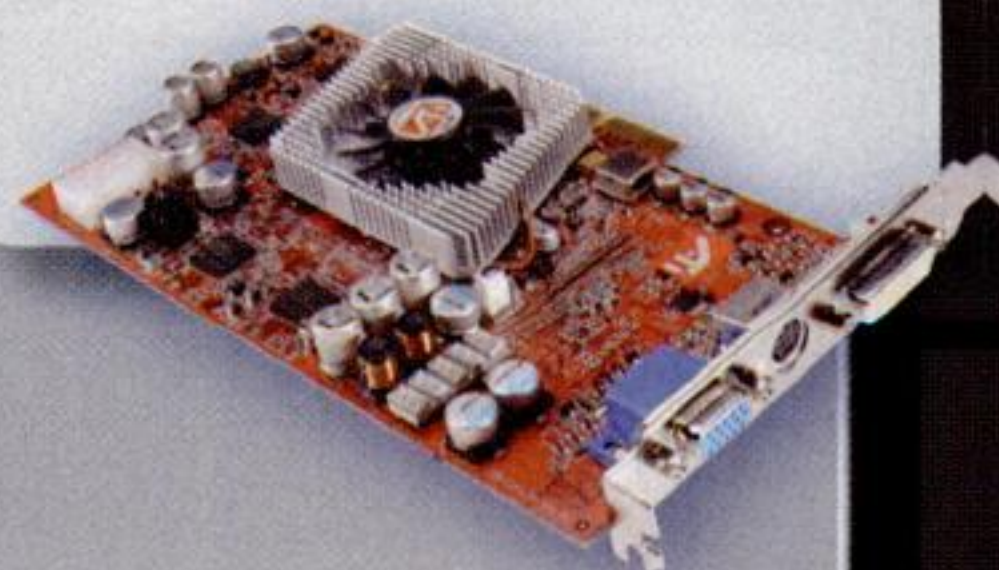
RAM: CRUCIAL PC3200 DDR 1GB

We used two 512MB DIMMs in our midrange system for a gig of PC3200—the RAM allotment all the kids are using these days. It's from Crucial, so we know it's quality stuff. We would have loved to use that fancy RAM with heatsinks and flashing LEDs, but we're keeping it real... real inexpensive, that is.



VIDEOCARD: ATI RADEON 9800 128MB

The obvious choice would be ATI's popular 9600XT budget card, but we opted for the non-Pro version of the Radeon 9800 because of its extra pipelines. The card turned in scores remarkably close to its Pro counterpart, despite costing half as much. It also offered playable frame rates in unofficial tests of *Far Cry* and *Unreal Tournament 2004*.



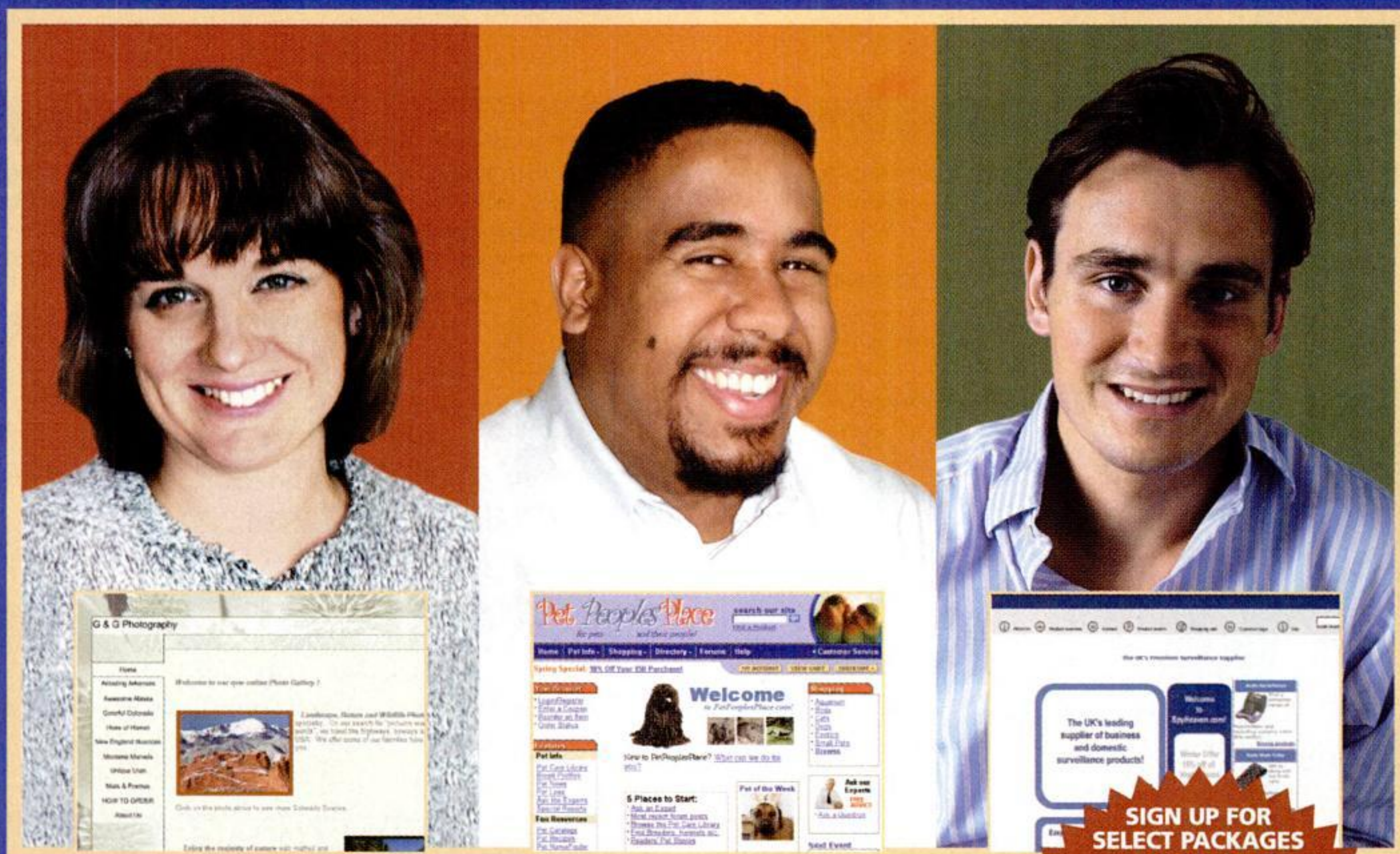
OPTICAL DRIVE: TOSHIBA SD-5112 4X DVD-R/RW

At the prices we're working with, there's just no getting around a no-frills drive, so we settled on a 4x burner from Toshiba. There's nothing special about it other than its affordability.

\$1,000 PC SPECS

MIDRANGE MONSTER	COST
Albatron K8X800	\$100
Athlon 64 3000	\$210
1GB Crucial PC3200 (2 x 512MB) CT6464Z40B	\$180
Antec Lanboy	\$80
Seagate 200GB 8MB ST3200822A	\$135
Radeon 9800 128MB	\$140
4x Toshiba SD-5112 DVD	\$60
WinXP Home	\$95
TOTAL	\$1,000

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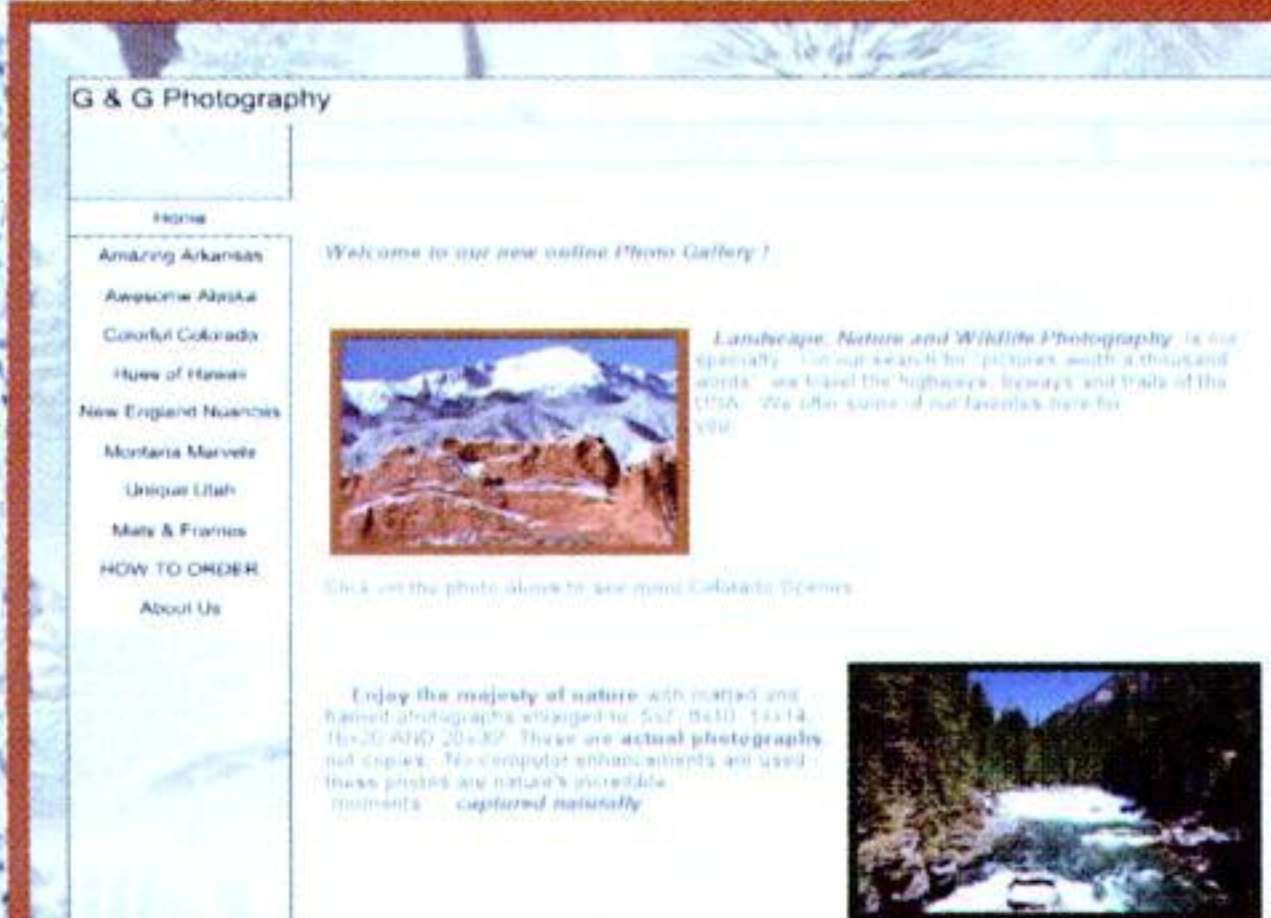
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Carl	Brown	653 Liberty Avenue, Wilmington, NC 28403	brownc2521@lycos.com	
Tom	Stowe	26 N. Hills Road, Chandler, AZ 85226	webunited@gms.net	
Helen	McSweeney	817 Providence Hwy., Boston, MA 02116	helenmcsweeney@hotmail.com	



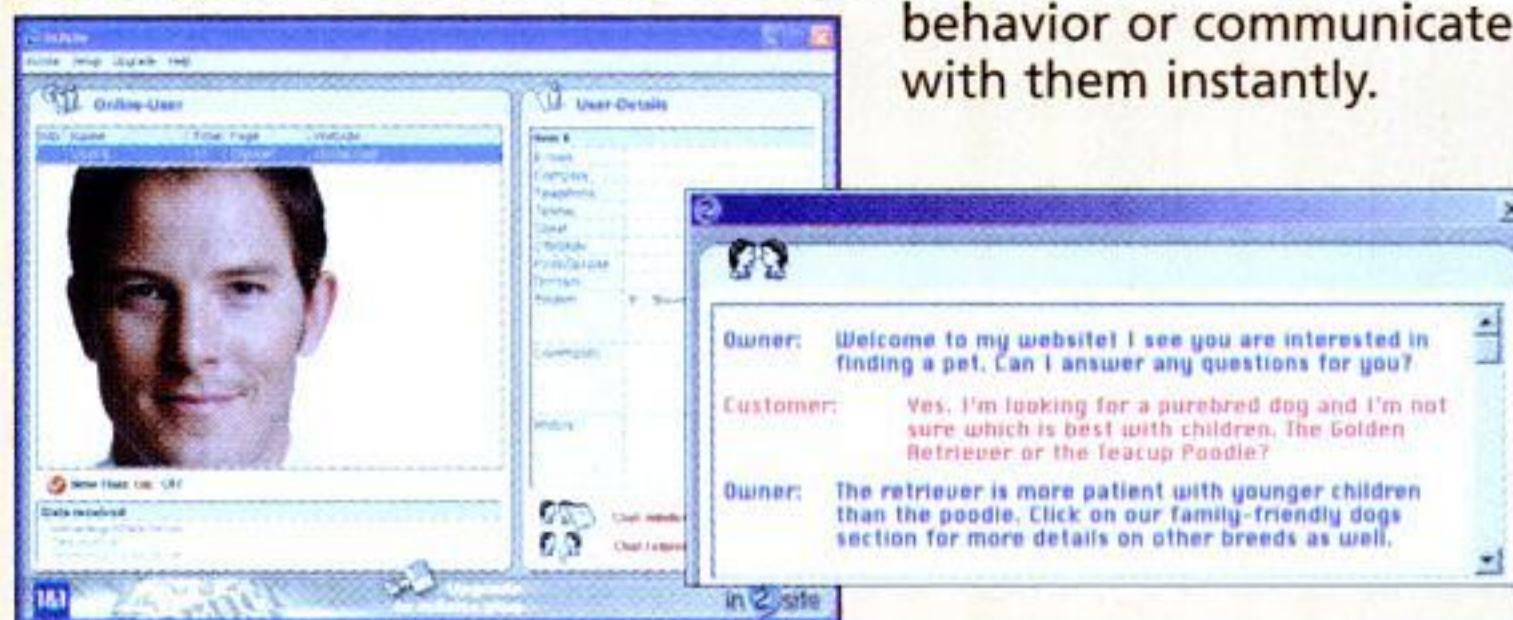
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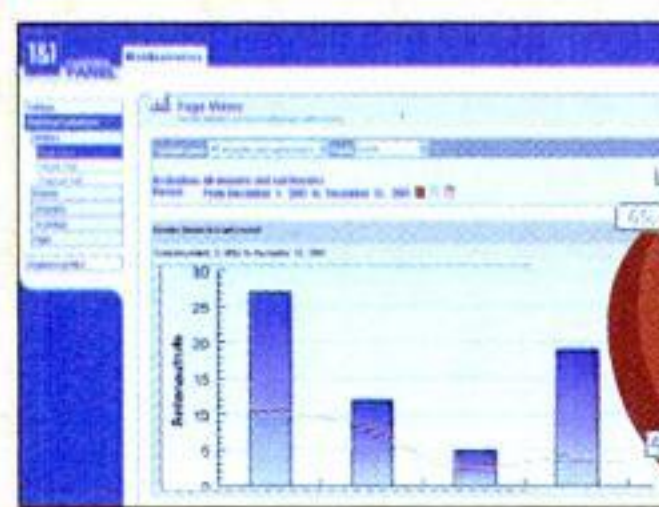
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- Daily backups

APPLICATIONS

- WebsiteCreator for 12 pages
- Full version software worth \$550
- 1&1 Control Panel

E-MAIL

- 50 POP3 e-mail accounts
- Aliases, auto-responders, forwarding
- 1&1 WebMail
- Virus scanner for 1 POP3 account

WEBSITE FEATURES

- Logfiles
- CGI library (counter, guestbook, etc...)
- FrontPage 2002 extensions
- Password protection

CRM/E-COMMERCE

- 1&1 WebStatistics
- chat channel
- Customizable forums

EXPRESS SUPPORT

- 24/7 support by phone and e-mail

BUSINESS PACKAGE

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INCLUDES 3 DOMAINS

DOMAIN NAMES

- Includes 3 domains at no additional cost
- Handling of unlimited domain names
- Point 100 external domains to 1&1
- 50 sub domains

WEBSITE/CONNECTIVITY

- 1,000 MB of Web space
- 5 FTP accounts, unlimited access
- 15,000 MB/Month bandwidth
- Protected by up-to-date firewall
- Daily backups

APPLICATIONS

- WebsiteCreator for 18 pages
- Full version software worth \$550
- 1&1 Control Panel

E-MAIL

- 150 POP3 e-mail accounts
- Aliases, auto-responders, forwarding
- 1&1 WebMail
- Virus scanner for 3 POP3 accounts

WEBSITE FEATURES

- Logfiles
- CGI library (counter, guestbook, etc...)
- Own CGI programming
- FrontPage 2002 extensions
- Advanced password protection
- Perl, PHP3 and PHP4
- 1x MySQL database (100MB)
- SSH shell access
- SSI (Server side includes)
- Cron Jobs

CRM/E-COMMERCE

- 1&1 WebStatistics
- 5 chat channels
- Customizable forums
- in2site one-on-one dialogue
- Newsletter Tool
- 1&1 WebDatabase
- 1&1 WebElements - Sophisticated Form Editor

EXPRESS SUPPORT

- 24/7 support by phone and e-mail

DEVELOPER PACKAGE

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INCLUDES 5 DOMAINS

DOMAIN NAMES

- Includes 5 domains at no additional cost
- Handling of unlimited domain names
- Point 200 external domains to 1&1
- 200 sub domains

WEBSITE/CONNECTIVITY

- 2,000 MB of Web space
- 25 FTP accounts, unlimited access
- 30,000 MB/Month bandwidth
- Protected by up-to-date firewall
- No limits on simultaneous hits/bandwidth
- Server priority
- Daily backups

APPLICATIONS

- WebsiteCreator for 25 pages
- Full version software worth \$550
- 1&1 Control Panel

E-MAIL

- 300 POP3 e-mail accounts
- Aliases, auto-responders, forwarding
- 1&1 WebMail
- Virus scanner for 6 POP3 accounts

WEBSITE FEATURES

- Logfiles
- CGI library (counter, guestbook, etc...)
- Own CGI programming
- FrontPage 2002 extensions
- Advanced password protection
- Perl, PHP3 and PHP4
- 3x MySQL databases (100 MB each)
- Cron jobs
- SSH shell access
- Advanced developer tools
- SSI (Server side includes)
- Dedicated SSL Certificate

CRM/E-COMMERCE

- 1&1 WebStatistics
- 10 chat channels
- Customizable forums
- in2site one-on-one dialogue
- Newsletter Tool
- 1&1 WebDatabase
- 1&1 WebElements - Sophisticated Form Editor

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LEAN MACHINE³

\$1,500 BEELZEBOX

RAM: CRUCIAL PC3200 DDR 1GB

Yes, it's the same memory we used in our mid-range system. The fact is, it's great memory. When you're on a budget, you don't want to blow your wad on fancy RAM when the money could be used for other, more important, hardware.

OPTICAL DRIVE: PLEXTOR P-708A 8X DVD-R/RW

This killer Plextor drive has made it onto every wish list we've concocted since it was first reviewed back in December. Now it finds itself upholding the optical end of the bargain in El Diablo. We were stunned, actually, that we could afford a dual-format Plextor drive for our low-cost system.

SOUNDCARD: CREATIVE LABS AUDIGY 2

The Beelzebox is the only rig in this roundup to boast a true-blue soundcard, reinforcing its role as the alpha male in this triad. Fact is, we could only afford such a lavish soundcard because we bought a 128MB video-card rather than a 256MB unit.

VIDEOCARD: ATI RADEON 9800 PRO 128MB

The 9800 Pro with a measly 128MB of RAM is yesterday's news around our lab, but it still kicks copious amounts of 3D hindquarters. During testing it was just a few frames slower in Halo than the 9800XT in our zero-point system. And it costs half as much. This videocard is hands-down the best performing card for the money on the market today.

MOBO: CHAINTech 9CJS ZENITH

Chaintech's Socket 478 mobo is the crown jewel of the P4 universe. It's a veritable smorgasbord of onboard expansion bays, slots, cables and goodies. We dig it because it's feature-rich, rock-steady, totally affordable, and built to support Prescott CPUs, hence its position on our "Best of the Best" component list since January.

HARD DRIVES: TWO WESTERN DIGITAL 360GD RAPTORS

We considered using a single 74GB Raptor, but figured it's less expensive and faster to use two 36GB drives in RAID 0. The results? Lightning-fast hard drive access and a benchmark boost across the board. This system has the least amount of storage space in this roundup, but the fastest disk transfers by a wide margin.



\$1,500 PC SPECS

BEELZEBOX	COST
P4 3.2GHz 800FSB	\$270
Chaintech 9CJS	\$155
1GB Crucial PC3200 (2 x 512MB) CT6464Z40B	\$180
CaseEdge Diabolic w/420w PSU	\$130
2 Western Digital Raptor 360GD 10K	\$220
ATI Radeon 9800 Pro 128MB	\$200
Plextor PX-708A 8X dual-format DVD-R/RW	\$160
Creative Labs SoundBlaster Audigy 2	\$75
Cable loom and auxiliary fan	\$15
WinXP Home	\$95
TOTAL	\$1,500

eMACHINE T3085

We test our Lean Machines against a factory-built PC



The T3085 is eMachine's top-of-the-line rig, and at \$620 (after a \$50 rebate), it sits squarely in the crosshairs of our \$500 and \$1,000 creations. We thought our hand-built rigs might slaughter the eMachine like wolves tearing into an innocent bunny, but surprisingly the eMachine held its ground.

In fact, the E-rig kicked sand in the front bezel of our \$500 rig, beating it in every benchmark except *Premiere* (AMD-based systems typically lose to Intel systems in this CPU-heavy benchmark). The T3085 also rang the Baby Boomer like a gong in *SYSmark 2004*, topping its score by more than 30 points. Naturally, the eMachine was slower than our \$1,000 rig by a wide margin in some benchmarks. Still, like our \$500 system, the T3085 is a decent foundation on which to build a respectable system. It has an AGP slot, supports DDR400 memory, and boasts killer onboard sound via the SoundStorm chip. Throw in some an awesome videocard, upgrade the CPU and memory, and *bada-boom, bada-bing*, you have yourself a full-blown gaming rig.

What is most surprising about the T3085 is the number of amenities it includes compared with both our \$500 and \$1,000 jobbies. For example, the systems we built were bare-bones—no keyboard, no mouse, no speakers, *nada*. The T3085, however, includes all these goodies, along with a DVD-RW,

40x CD-ROM, and an 8-in-1 media reader. Plus eMachine provides tech support, a factory warranty, etc.

We'll always advocate building a system over buying an OEM product, but as far as budget rigs go, eMachine has put together a decent package at a reasonable price.

DARE TO COMPARE: Lean Machines					
	\$500	\$1,000	\$1,500	Zero-point*	eMachine
Jedi Academy (fps)	17.1	42.5	46.2	54.4	27.6
Halo (fps)	6.22	28.50	34.9	38.8	WNR**
MusicMatch (sec)	375	303	240	281	309
Photoshop (sec)	545	311	275	289	461
Premiere (sec)	795	817	544	720	842
SYSmark 2004	91	158	190	172	123

Best scores are bolded.

* Our zero-point test system uses an Athlon FX-51 CPU, an nForce3 motherboard, an ATI Radeon 9800XT videocard, and a Western Digital 2500JB hard drive.

** The onboard graphics of the eMachine T3085 don't support pixel shaders, and were thus unable to run Halo at our default settings. It would run without specular lighting or shadows, but these features need to be on in order to provide comparable numbers.

CONCLUSIONS

What We Learned

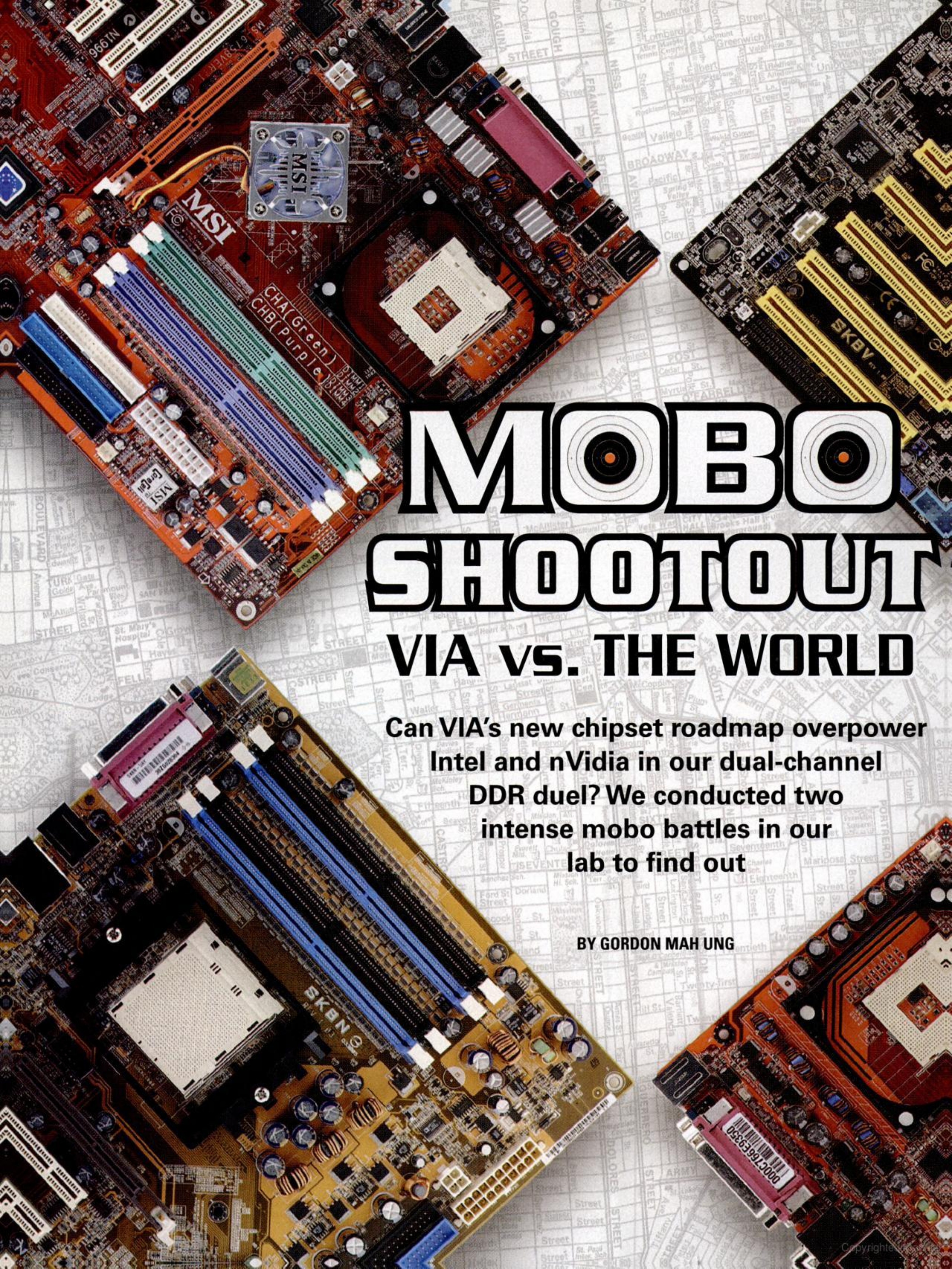
Overall, our journey into the mysterious land of budget PCs has been illuminating in myriad ways. The most startling discovery was how much ass our \$1,500 PC kicked. Because it cost half as much as the PCs we typically review, our expectations were modest. But the Beelzebox performed well beyond our greatest hopes, beating our Athlon 64 FX-based zero-point system in four out of six benchmarks. Of course, the Beelzebox scored lower than the zero-point system in gaming tests thanks to the latter's 9800XT, but the narrow margin between the two is interesting.

The \$1,000 machine scored surprisingly well too, nipping at the heels of the FX 51-based zero-point system in every test. That's not too shabby considering that the A64 CPU costs a third of the price. The Midrange Monster also proved itself a viable gaming box by running both *UT2004* and *Far Cry*—the only "next-gen" games we had lying around—like butter. The Midrange Monster was also *a lot* faster than the Athlon XP 3000 box from eMachines, but it cost substantially more.

Finally, we come to the \$500 Baby Boomer, which we dubbed "the little rig that couldn't." We won't blow smoke up your nether regions, folks—this PC's performance was

abysmal. We lay blame for this system's sluggish benchmark scores on the 2.7GHz Celeron's PCB; its lack of cache held it back in every challenge. However, the Boomer has amazing upgrade potential, which was our number one priority in building this entry-level PC. We could have made it a little faster in some benchmarks to the detriment of upgradeability, but we didn't think it was a worthy trade-off. With a little bit of love and another \$500 it could shine—\$1,000 seems to be the point where PCs evolve from boys to men.

At \$1,500 a PC grows a patch of fur on its chest and can take on all comers, which is great news for PC fanatics and penny pinchers alike. ■

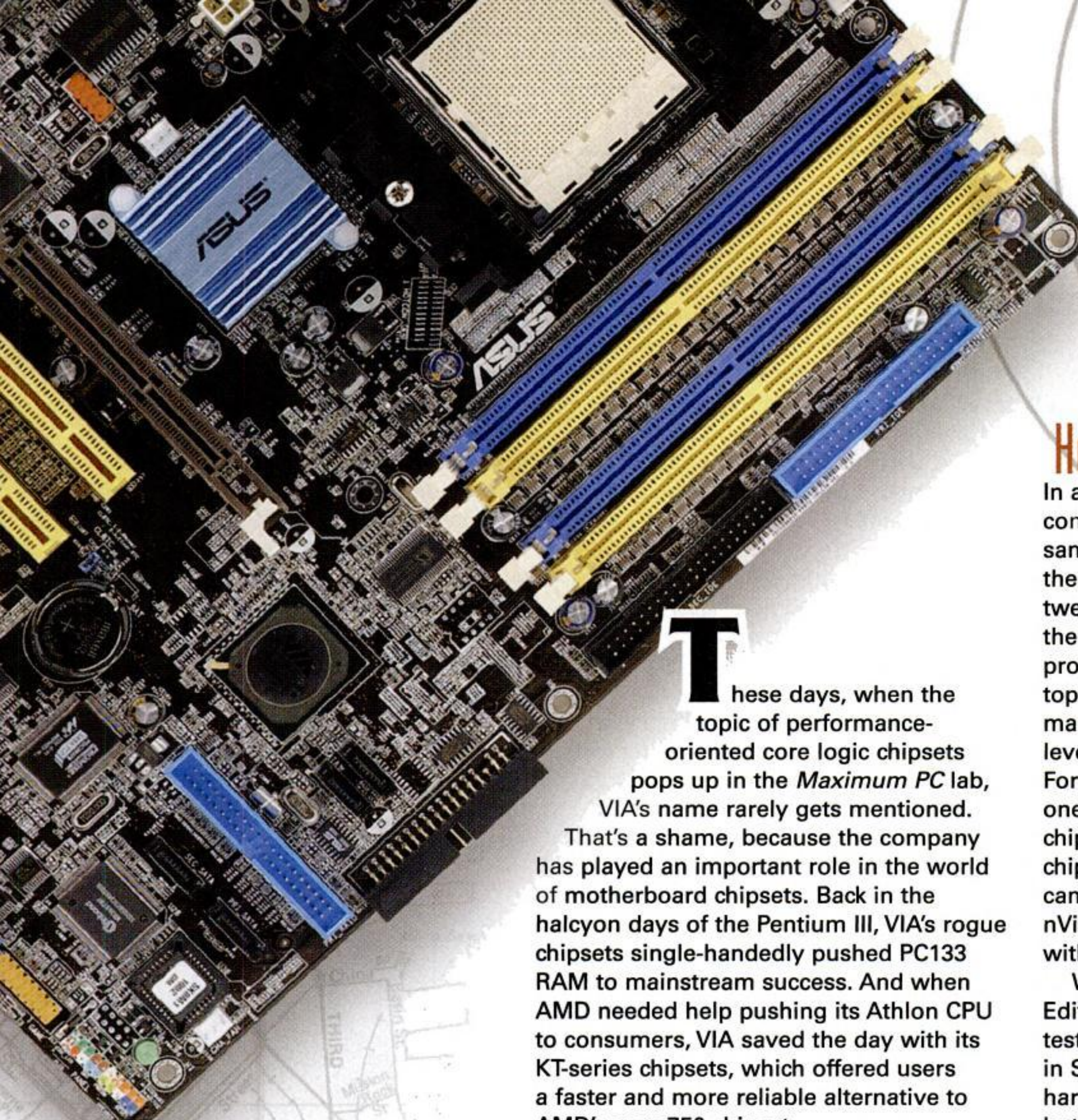


MOBO SHOOTOUT

VIA vs. THE WORLD

Can VIA's new chipset roadmap overpower Intel and nVidia in our dual-channel DDR duel? We conducted two intense mobo battles in our lab to find out

BY GORDON MAH UNG



How We Tested

In an effort to reproduce real-world conditions, we avoided using engineering samples; essentially hand-made by the vendors, these early boards can be tweaked and rarely match the results of the final product. Instead, we relied on production-quality motherboards from two top manufacturers. We chose the same manufacturer for both chipsets in order to level the playing field as much as possible. For the Intel duel, we asked MSI to provide one motherboard with Intel's leading 875P chipset and one with VIA's new PT880 chipset. To represent the Athlon 64 FX camp, we asked Asus for a board running nVidia's nForce3 Pro 150 chipset, and one with VIA's new K8T800.

We used a 3.4GHz Pentium 4 Extreme Edition for the Intel tests. For the AMD tests, we used the new Athlon 64 FX-53 in Socket 940 boards. We used the same hardware components and drivers for both platforms: an ATI Radeon 9800 Pro with Catalyst 4.2 drivers, a Western Digital WD2500JB, and 1GB of Corsair Micro DDR400. (For the AMD machine, of course, we had to use registered RAM.)

To test the performance of the boards and chipsets, we ran our usual suite of tests that stress memory bandwidth, the CPU, and hard drive performance. We used *SYSMark 2004* to gauge application performance, and for games, we ran *Quake III Arena*, *Unreal Tournament 2003*, *3DMark2001 SE*, and *AquaMark 3* benchmarks. *SiSoft Sandra 2004* was used to measure memory bandwidth, and we also threw in *Premiere Pro*, *SPEC's ViewPerf 7.11*, and our standard *Photoshop 7* test for good measure. For brevity's sake, we're not printing the *ViewPerf* results or the complete version of the *SYSMark* results; you can find all the dirty details for these benchmarks on our web site at www.maximumpc.com.

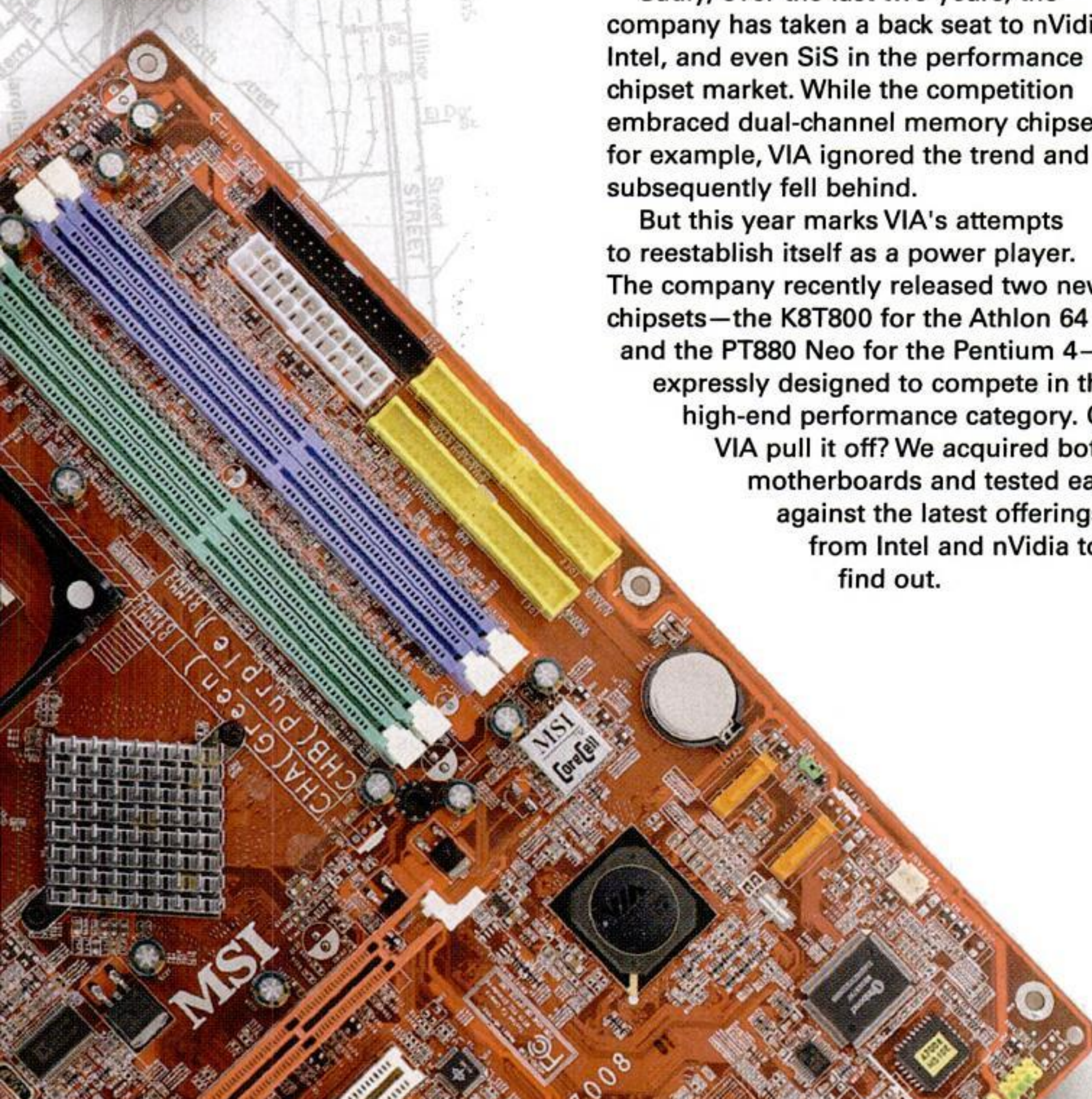
Now let's take a look at the results!

These days, when the topic of performance-oriented core logic chipsets pops up in the *Maximum PC* lab, VIA's name rarely gets mentioned.

That's a shame, because the company has played an important role in the world of motherboard chipsets. Back in the halcyon days of the Pentium III, VIA's rogue chipsets single-handedly pushed PC133 RAM to mainstream success. And when AMD needed help pushing its Athlon CPU to consumers, VIA saved the day with its KT-series chipsets, which offered users a faster and more reliable alternative to AMD's own 750 chipset.

Sadly, over the last two years, the company has taken a back seat to nVidia, Intel, and even SiS in the performance chipset market. While the competition embraced dual-channel memory chipsets, for example, VIA ignored the trend and subsequently fell behind.

But this year marks VIA's attempts to reestablish itself as a power player. The company recently released two new chipsets—the K8T800 for the Athlon 64 FX and the PT880 Neo for the Pentium 4—expressly designed to compete in the high-end performance category. Can VIA pull it off? We acquired both motherboards and tested each against the latest offerings from Intel and nVidia to find out.



MOBO SHOOTOUT

Asus SK8N vs. SK8V

Athlon 64 chipset challenge:
nVidia's nForce3 chipset takes
on VIA's K8T800

ROUND 1: PRESENTATION

Asus has a reputation for making fast, stable boards, but the mobo manufacturer has never had a rep for making a sexy-looking product. Sporting an orange (or is it light brown?) paint job, the Asus SK8N, based on nVidia's nForce3 Pro 150, stays true to this plain-Jane aesthetic. The SK8V (based on VIA's K8T800 chipset), on the other hand, looks sharp with its black veneer, yellow PCI connectors, and color-coded front panel headers.

WINNER: SK8V

ROUND 2: FEATURES AND SPECS

The original nForce3 Pro 150 chipset was initially intended for business machines, which explains the distinct lack of pizzazz. This also explains why the nVidia-based SK8N is comparatively light on features. While you get a Promise PDC20738 chip that supports Serial ATA RAID and an additional parallel ATA port, you don't get much else.

Audio is handled by a RealTek ALC650 codec that supports up to six-channel audio. A Texas Instruments chipset and a six-port IEEE 1394 port allows FireWire 400. Networking is handled by Fast Ethernet embedded into the single-chip nForce3 Pro 150 chipset and a RealTek RTL8201. But where's the Gigabit Ethernet? Or how about the dual RAID?



Asus' SK8V is a spicy, colorful number that features dual SATA and Gigabit Ethernet. Take that, SK8N!

The VIA-based Asus SK8V is more feature-rich. The SK8V uses the same Promise PDC20738 controller as the SK8N, which is a solid choice as Promise has already made 64-bit beta drivers available. Also impressive: a second set of SATA ports available through the VIA VT8237 south bridge. This gives you the option of running dual RAID or simply running four SATA drives.

Asus also integrates its own Wi-Fi connector. Located near the fifth slot, this connector lets you hook up a proprietary but inexpensive Wi-Fi module to the mobo that can also function as an access point. When you consider that external access points with built-in routers can be purchased for as little as \$30, it's not super remarkable, but it's a good enough idea that Intel replicated the move in its upcoming Grantsdale chipset.

The SK8V also offers Gigabit support via a 3Com/Marvell chip. Because of the SK8V's design, the Gigabit is plugged into the PCI bus, which gets clogged with other PCI traffic, so it won't offer the same bandwidth as nVidia's upcoming nForce3 250, or an Intel motherboard with communication streaming architecture (CSA). Regardless, it's better than having just a Fast Ethernet port.

WINNER: SK8V

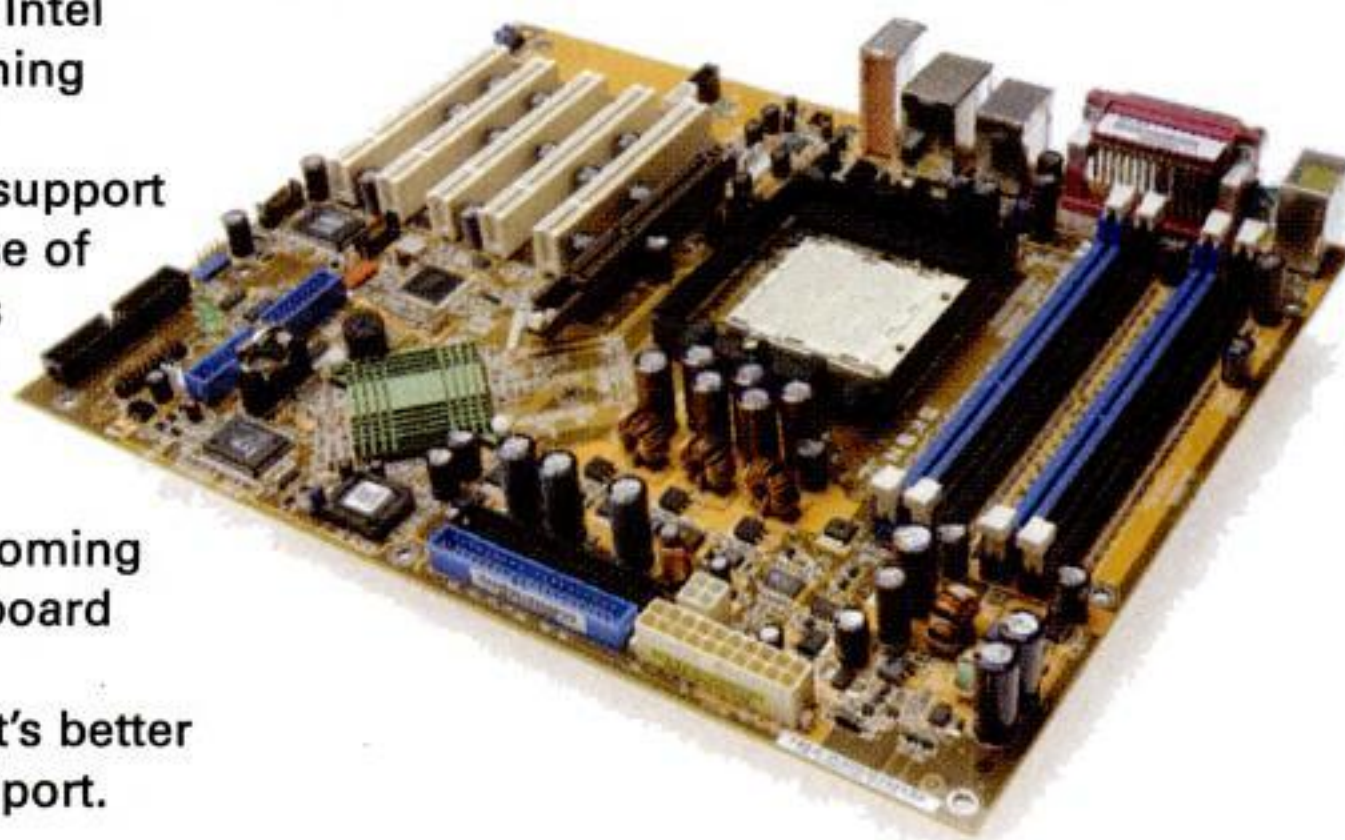
ROUND 3: THE SILICON

The heart of both the SK8N and the SK8V is the core logic chipset. Interestingly, nVidia and VIA have taken two vastly different approaches in this respect. The nForce3 Pro 150 deviates from the norm and uses a single-chip design. In traditional chipset design, the north bridge houses the circuits that control memory, communications with the CPU, and AGP, while the south bridge runs the hard drives, PCI slots, USB, and has conduits for the floppy drive, modem, audio, and network components. The two chips are connected by a conduit that runs at clock speeds ranging from 133MB/s to 1GB/s. By using a single-chip approach, nVidia offers a key advantage: improved latency. In a single-chip solution, a signal only has to travel from one side of the chipset to the other side. This is significantly faster than a two-chip setup, in which the signal has to travel two or three inches.

Unfortunately, what the single-chip solution makes up for in latency, it loses in flexibility. If a manufacturer wants to add a new feature that takes advantage of the south bridge, such as RAID, the whole chipset has to be replaced. In dual-chip designs, only the south bridge would have to be replaced in this situation.

In terms of the HyperTransport link between the CPU and chipset, nVidia suffers in comparison with VIA. The nForce3 150 Pro uses just a 600MHz HyperTransport link, while VIA uses an 800MHz HT link.

And then there's the all-important matter of reliability. It's difficult to objectively test stability, and we've experienced very few problems of our own with either chipset, but anecdotally,



The SK8N, one of the plainest-looking boards we've seen in years, lacks Gigabit Ethernet.

we've heard numerous complaints regarding VIA-based chipsets over the years. Apparently, the company still has a less-than-stellar reputation for reliability and stability.

So, while the K8T800 boasts more features, its lackluster reputation for stability allows the nForce3 Pro 150 to pull even in this category.

WINNER: TIE

ROUND 4: PERFORMANCE

Performance is where the rubber meets the road, and we were initially shocked and then confused by the test results we saw. In some benchmarks, like *Quake III Arena* and *SYSmark2004*, the SK8V/K8T800 exhibited a clear speed advantage. But then the same setup got trounced by the SK8N/nForce3 Pro 150 combo in *AquaMark 3*, *3DMark2001 SE*, and *3DMark 2003*. The nForce3 also pulled ahead in the synthetic memory

benchmark *SiSoft Sandra 2004*.

We were similarly surprised by the results in *ViewPerf 7.11*. This benchmark uses workloads from pro-level workstation benchmarks to test OpenGL performance. Early Internet reviews of the nForce3 indicated it performed poorly in this test; many of the reviewers jumped to the conclusion that the chipset's slower 600MHz HyperTransport link was at fault. nVidia explained these slow results as driver problems that have since been addressed. Our testing

indicated that both chipsets were evenly matched.

As a side note, nVidia contends that its own internal testing actually shows the nForce3 to be faster than the K8T800 in *Quake III Arena*, thanks to the "proprietary things we are doing with the internal architectures and the drivers on both end." This means that if you run the nForce3 with a GeForce FX card, you may see better performance.

So who's the winner here? This round looks like a tie. Both VIA and nVidia

gave as good as they got, each winning a few tests and losing a few. We admit to being troubled by the SK8N's lower *SYSmark 2004* scores, but in the nForce3 Pro 150-based chipset's defense, it did perform better in some of our gaming benchmarks (including *QIIIA*). Given its higher scores in *UT2003* and *QIIIA*, we expected the VIA chipset to win more benchmarks than it actually did. Had it done so, it probably would have won the round.

WINNER: TIE

THE WINNER: SK8V

This one's close. The performance and chipset rounds ended up in a draw, so the contest boils down to features and flash. With Gigabit Ethernet, dual SATA, and a snazzier appearance, the SK8V winds up pulling ahead of the SK8N.

BENCHMARKS		
	Asus SK8V	Asus SK8N
Chipset	VIA K8T800	nVidia nForce3 Pro 150
SYSMark2004 Overall	193	183
Content Creation Overall	222	213
Office Productivity Overall	167	158
Photoshop 7.0.1	266	266
Premiere Pro	678	681
SiSoft Sandra 2004 RAM Composite	5,575	5,809
Comanche	73.89	73.1
AquaMark 3 CPU	9,898	10,393
3DMark2001 SE	20,349	20,419
3DMark2003 CPU	779	807
Jedi Academy	47.5	41.3
Unreal Tournament 2003 Flyby	321.9	315.4
Quake III Arena	470	444

Best scores are in blue.



Mobo Preview

The nForce3 is with You

Hardware firewalls and high-performance Gigabit Ethernet are among the exciting features in nVidia's nForce3 250

Even nVidia freely admits that the original nForce3 Pro 150 wasn't designed to rock our world. Designed more for integration with business desktops and workstations (hence the Pro moniker) than high-performance PCs, the chipset lacks many features we expect in a modern core logic chipset. And then there's the sluggish 600MHz HyperTransport link between the CPU and chipset, which pales in comparison with the competition's 800MHz links.

With the upcoming release of the nForce3 250, nVidia appears intent on fixing all the missing features in the 150. Here's how the company will do it:

SERIAL ATA SUPPORT: The chipset's phantom Serial ATA support (which nVidia says is actually in the original 150, but wasn't turned on) is now present. In fact, the nForce3 250 will run up to four SATA drives as well as two parallel ATA ports.

GIGABIT ETHERNET AND THEN SOME: New in the 250Gb version of the chipset is an advanced Gigabit Ethernet controller. Like Intel's CSA port, which hooks Gig-E directly to the north bridge for higher throughput, nVidia's Gigabit Ethernet takes advantage of the high-bandwidth capabilities of the single-chip nForce3. In demonstrations we've seen, Gigabit performance in the nForce3 250Gb was roughly twice that of a PCI card, and even slightly faster than Intel's CSA solution. Even better, nVidia is integrating a hardware-based personal firewall into the 250Gb's chipset that is capable of stateful and stateless packet inspection.

FASTER HYPERTRANSPORT LINK: Although we haven't actually seen any impact from the 800MHz HT link, the new nForce3 now supports 800MHz.

RAID DEBUTS: Although there's no "Matrix" mode like that in Intel's upcoming Grantsdale/Alderwood chipset (see page 53), nVidia's new chipset supports RAID spans across both parallel and SATA drives.

We expect the nForce3 250Gb chipset to launch with support for Socket 754 Athlon 64 CPUs as well as the upcoming Socket 939 interface for Athlon 64 and Athlon 64 FX CPUs this spring.

MOBO SHOOTOUT

MSI 875P Neo vs. the PT880 Neo

David takes on the Goliath of P4 chipsets in an epic tussle

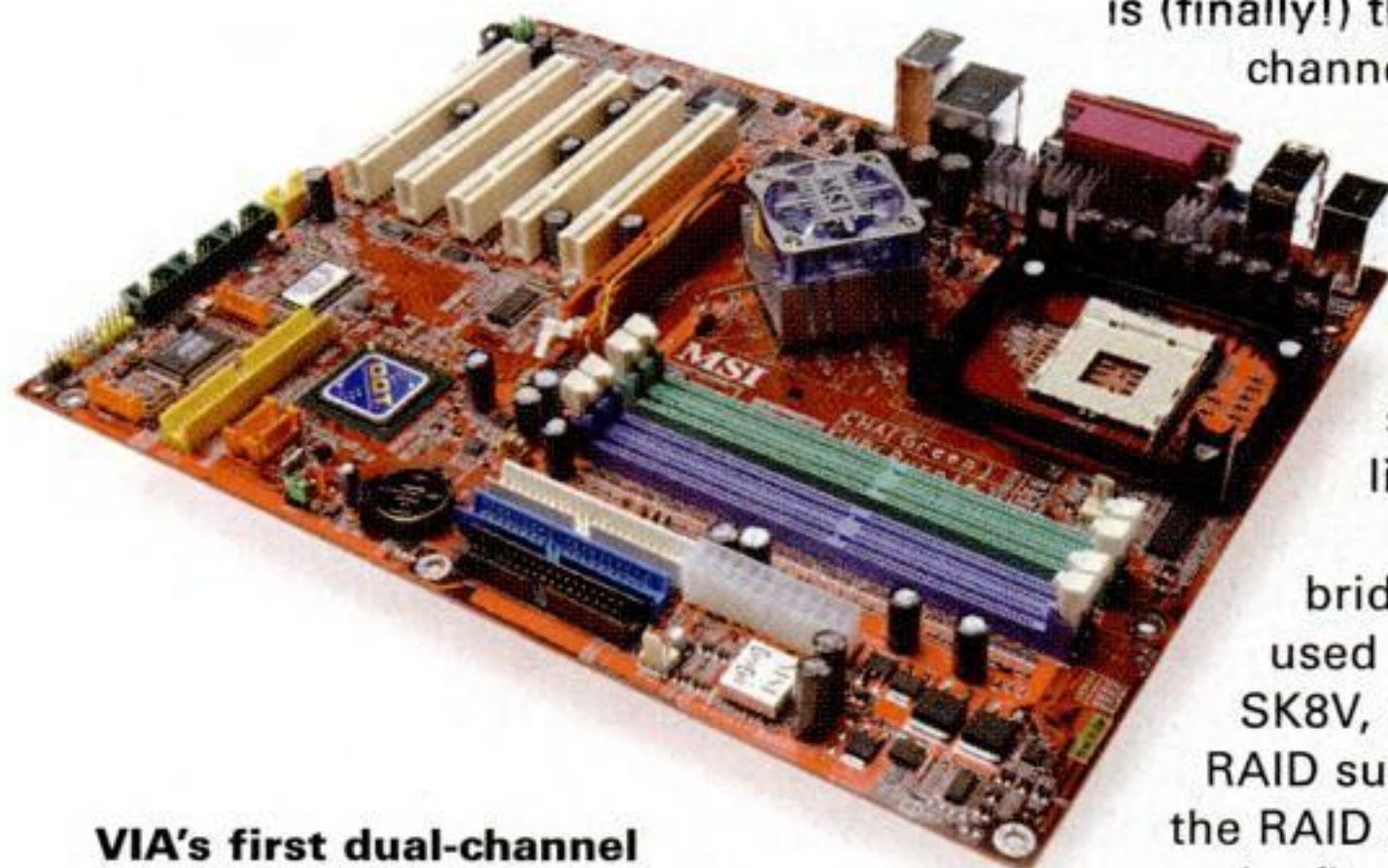
ROUND 1: PRESENTATION

With its sexy-looking PCBs and fun, multicolored AGP, IDE, and RAM slots, MSI's pair of Intel Socket 478 motherboards resemble Mardi Gras revelers when compared with Asus' sedate offerings. We're not typically huge fans of bling, but the 875P Neo's heatsink fan, which lights up in stylish blue and red colors, takes the cake in this round.

WINNER: 875P NEO

ROUND 2: FEATURES AND SPECS

MSI's 875P Neo is brimming with features: FireWire 400 with support for two six-pin ports using VIA VT6306 silicon, eight High Speed USB 2.0 ports, and optical and coax SPDIF running off an ADI1980 audio codec. Also present is quad SATA, which uses the capabilities of the Intel 875P south bridge and an additional Promise PDC 20378 chip.



VIA's first dual-channel chipset for the Pentium 4 performs admirably, but can it compete with Intel?

Finally, there's full Gigabit support that uses Intel's CSA for top networking performance. MSI also equipped the board with its signature "D" bracket, which features four LEDs that indicate what goes right—or wrong—when you boot your PC.

MSI's PT880 Neo is spec'd almost as

impressively as Intel's. There are six-pin and four-pin FireWire ports on the I/O shield, which uses the same VT6306 silicon as the 875P. And while the board features just four High Speed USB 2.0 ports, two additional USB headers can be hooked up to the front or top ports on a case. A RealTek chip runs the audio using an ALC655 codec. The Gigabit Ethernet is managed by the RealTek RTL8110S.

So who's the winner? Again, both boards are close in quality, but the 875P's dual-RAID configuration and greater number of USB ports give it the nod.

WINNER: 875P NEO

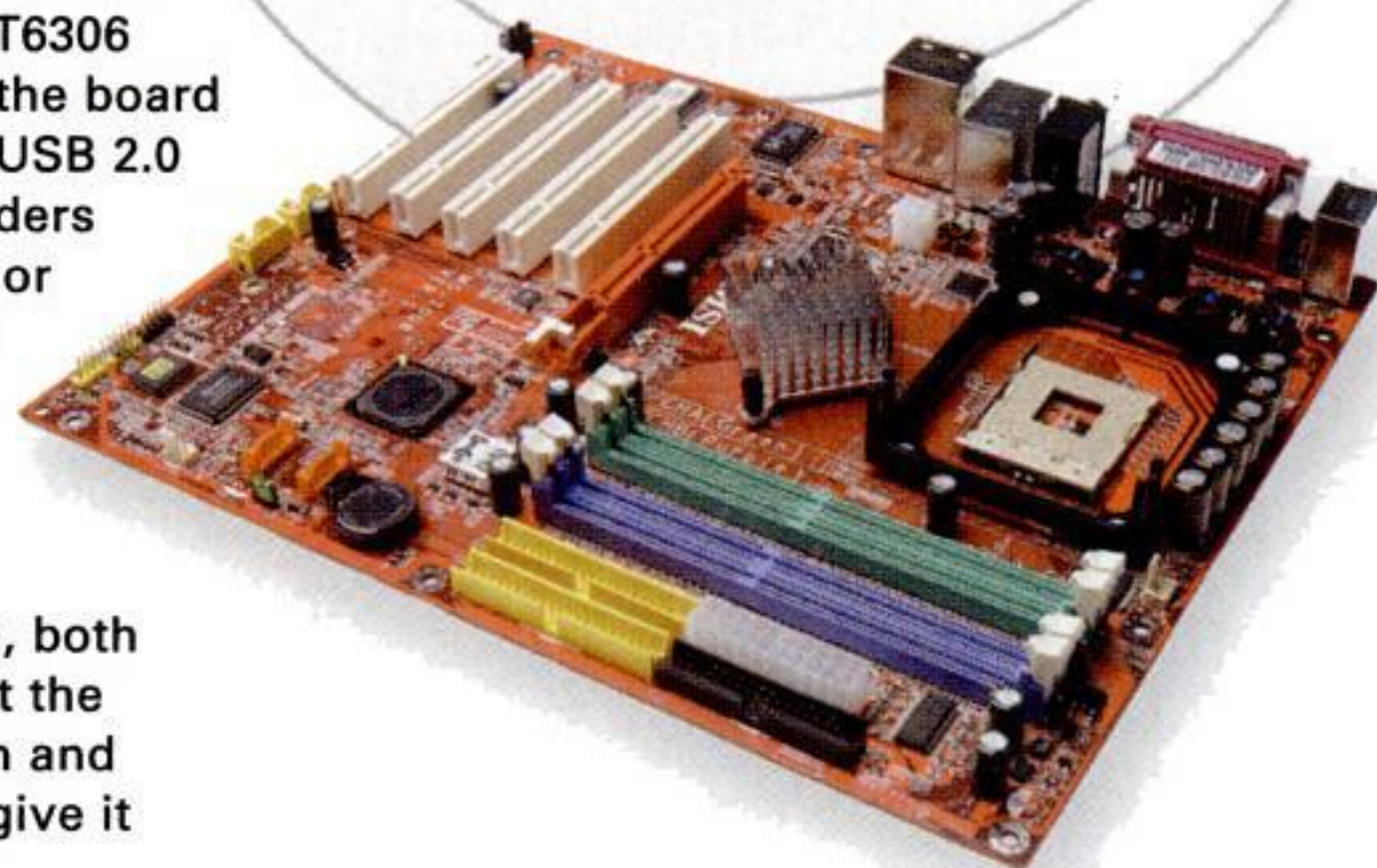
ROUND 3: THE SILICON

The PT880 isn't VIA's first P4 chipset. The company actually made a run at the P4 market with the P4X266 chipset, which resulted in an Intel lawsuit that claimed VIA didn't have the legal rights to manufacture a P4 chipset. In addition to these legal woes, the P4X266 was a major dud when compared with Intel's dual-channel RDRAM Intel 850 chipset.

After dabbling with the P4X333, P4X400, and PT800, and after settling its legal dispute with Intel, VIA arrives on the scene with the PT880, which is (finally!) the company's first dual-channel RAM P4 chipset.

Supporting up to 8GB of RAM and both P4 and Celeron processors running from 400MHz to 800MHz frontside bus speeds, the PT880 looks like a winner on paper.

The PT880's south bridge is the same VT8237 used in the VIA-based Asus SK8V, and also features SATA RAID support. While we appreciate the RAID support, the fact that you need a floppy drive to install Windows XP makes it clumsier than Intel's 875P, which allows the use of a SATA drive. One advantage the VIA chipset has is a faster interconnect speed between the north and south bridge. VIA's interconnect runs at 533MB/s; Intel's top line chipset continues to use a pokey 266MB/s interconnect that can potentially be overburdened by USB, hard disk, and FireWire activity. Intel alleviates this flaw by moving the Gigabit Ethernet to a special port in the



The 875P in MSI's 875P Neo mobo features lots of features, a powerful memory controller, and a tasteful touch of flashiness.

north bridge known as communications streaming architecture (CSA), which lets GiG-E reach far higher speeds than it could if plugged into a PCI port.

Both the VIA and Intel chipsets support most Socket 478 processors up to 800MHz. Intel alone features "Performance Acceleration Technology" in the 875P. Sounds neat, but from what we can tell, this is really just a matter of Intel grabbing the best chips from manufacturing and running them at higher internal clocks.

At the end of our silicon-oriented deliberations for these two chipsets, we decided the 875P's superior CSA capabilities outweigh its low-bandwidth interconnect. When we finally factored in Intel's superb reliability—the company is essentially the gold standard in terms of stability—choosing the winner in this category was easy.

WINNER: 875P NEO

ROUND 4: PERFORMANCE

Because the CPUs for these chipsets don't have embedded memory controllers (like the Athlon 64 FX), the memory controller plays a more critical role in overall performance. Unfortunately for VIA, the memory controller is the 875P's greatest strength. When Intel released the 875P, the company wanted to own the fastest DDR performance out of the gate; thus far, the chipset hasn't been a disappointment. Although VIA's PT880 puts up a good fight, the 875P

won most of our benchmark tests. Just look at the chart below: Intel wins in *AquaMark 3*, both *3DMark2001* and *3DMark 2003*, and *Unreal Tournament 2003*.

Oddly, we witnessed a score we're

at a loss to explain: The PT880 crushed the 875P in our *Quake III Arena* tests. Its *QIII A* scores even bested the extremely fast Athlon 64 FX-53/K8T800. Why doesn't this performance translate into the other gaming benchmarks?

We're not sure, but our lab is dutifully investigating the phenomenon.

In applications, the PT880 lags behind the 875P by 2 to 3 percent. That's not bad, but there's no *Maximum PC* cigar for second place. Overall, the PT880 Neo is a solid alternative to the 875P, but there are simply too many wins in the Intel column.

WINNER: 875P NEO

THE WINNER: 875P NEO

Intel's 875P boasts better specs and more features, and it beats the PT880 Neo in almost all our benchmarks, so there's no denying the 875P Neo's superiority. This one's a clean sweep. ■

BENCHMARKS		
Motherboard	MSI 875P Neo	MSI PT880 Neo
Chipset	Intel i875P	VIA PT880
SYSMark2004 Overall	196	193
Content Creation Overall	229	225
Office Productivity Overall	167	165
Photoshop 7.0.1	254	270
Premiere Pro	515	527
SiSoft Sandra 2004 RAM Composite	4,555	4,658
Comanche	74.22	73.06
AquaMark 3 CPU	10,391	9,850
3DMark2001 SE	19,898	19,655
3DMark2003 CPU	820	793
Jedi Academy	46.2	46.3
Unreal Tournament 2003 Flyby	293.5	291.5
Quake III Arena	460	498

Best scores are in blue.



Mobo Preview

Change is coming: Intel's new Alderwood and Grantsdale

With PCI Express and DDR2 support, these new chipsets will totally revamp your PC!

Only the crustiest of old-timers have previously experienced the kind of massive sea change to PC architecture that will occur this summer. When Intel's next-gen Hi-Po chipset makes its debut in the 925X (aka Alderwood) and the budget-conscious 915P/G (aka Grantsdale), it will mark the arrival of a slew of new features: a new 775-pin socket, PCI Express support, PCI Express for Graphics, the new BTX formfactor, and DDR2. Let's take a look at the high points:

DMI: In both the Alderwood and Grantsdale, Intel will dump the biggest weakness of the 875P chipset—the 266MB/s “HUB” interface between the north bridge and the south bridge—in favor of a new direct media interface (DMI). In the older interface, data flowed both ways along the same data link. With DMI, a dedicated 1GB/s link will send data from south to north, and a separate link will send data north to south.

MATRIX RAID: For RAID, both Alderwood and Grantsdale

use the Hi-Po chipset's new ICH6R south bridge, which builds on the RAID capability of the ICH5R. Dubbed “Matrix RAID,” this fancy, newfangled addition will appeal to PC users who desire both the performance of striping and the security of mirroring. In a Matrix RAID configuration, you still use two drives to build your RAID, but you can now configure one portion of your array to mirror and another portion to do striping.

HIGH-DEFINITION AUDIO: The 925X and 915P/G also offer a new multichannel High Definition Audio spec. Previously code-named Azalia, the spec promises up to 192KHz/24-bit audio and Dolby support. The quality level of HD Audio remains to be seen—er, heard—but if Intel successfully pulls it off, onboard Audio could seriously threaten the add-in audio card market.

DDR2: Board vendors will be able to configure each of Intel's new chipsets to support either DDR or DDR2, at 400MHz and 533MHz. Even better, the new chipsets will no longer require matched sticks of RAM. With 875P, you need matching speeds and sizes of RAM in order to run in dual-channel mode. With the 915P/G and 925X, you should be able to run a 512MB DIMM in one slot and two 256MB DIMMs in the third and fourth slots while maintaining dual-channel performance (as in nVidia's nForce2 chipset).

We expect to see motherboards using the 925X and 915P/G this summer.

THIS MONTH:

LCDs FOR GAMERS

Can today's LCDs live up to the expectations of hardcore gamers?

Aggressive pricing, improved image technology, and a thin, light profile have made LCDs formidable opponents of CRTs. But not everyone's renting a forklift to heave their old monitors out the window. Especially not gamers. Early generations of affordable LCDs earned a poor reputation for being unable to keep up with the fast motion served by any game more demanding than *Tetris* (not to mention video playback).

But is that still the case? Today's LCDs retain all their original advantages, but are attracting gamers with more rapid pixel response times—that is, the speed at which each pixel can change color. The faster the pixel response time, the sharper the image

you're going to get during motion.

We applaud manufacturers' efforts to make LCDs more viable for gamers, but how successful have they been? That's what we decided to investigate. We asked manufacturers to send us the best LCDs they could offer to gamers (many simply refused to do so, knowing, perhaps, that our taunts would be cruel if an LCD couldn't cut it). We put each monitor up against Sony's 21-inch flat Trinitron GDM-F520 for side-by-side testing. We used *Need for Speed: Underground* and *Quake III* (rocket trails, anyone?) for testing, and Dramamine to ward off any blur-

induced nausea.

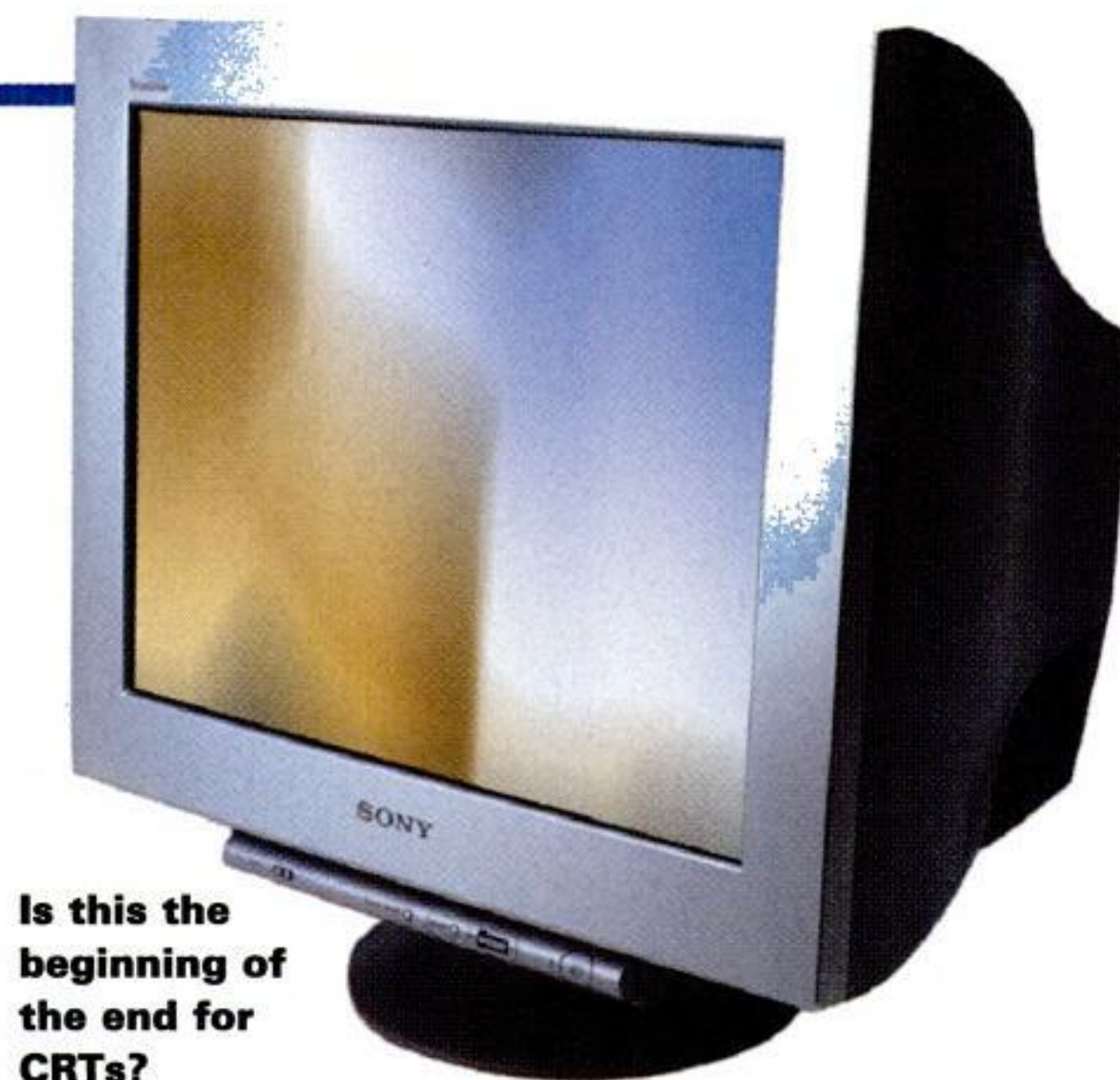
Check out the following pages to see if that sexy LCD you've been eyeing will show your games in all their glory, or if you'll end up reaching for the barf bag before you fire off your first shot.

—LOGAN DECKER

WHAT WE'RE LOOKING FOR

As in all Maximum PC Challenges, there are proud winners and sorry losers. Three *Maximum PC* judges used three gaming-specific criteria to draw a line between the two categories. First, we examined each LCD for evidence of ghosting, blurring, and smearing of images. These problems are associated with pixel response time, which is usually expressed as a combination of the "rise" (the time it takes in milliseconds for a pixel to go from black to white) and "fall" (from white to black). If pixels can't respond to changes fast enough, rounding a hairpin turn at 90mph in a racing game, for instance, will make the entire screen appear out of focus. This is tremendously hard on the eyes as they struggle to keep a lock on detail. And all that effort developers put into high-quality textures—and all that money you paid for a videocard that can display them—goes out the window. Unfortunately, different manufacturers have different ways of measuring pixel response time, and others don't mention it at all. So if you're interested in a gaming LCD that's not represented in these pages, there's simply no substitute for going to a store and getting a demonstration.

Next, we checked to see how well LCDs handle interpolation. LCDs have a fixed number of pixels; an LCD with a native resolution of 1280x1024, for example, has 1,310,720 hard-wired pixels arranged in its matrix. If you want to run a game at any other resolution, the LCD must interpolate pixels; in other



Is this the beginning of the end for CRTs?

words, scale them to a lower resolution by making three pixels, for example, appear as one. The effect on text (say, in a *Word* document) is devastating, looking something like the output from a manual typewriter. The effect is less noticeable in games, but like ghosting, interpolation causes blurriness that's uncomfortable to look at, and even nauseating after a while.

Finally, an LCD monitor must offer brightness and contrast comparable to a CRT, or the deal's off.

GHOSTING

Ghosting occurs when pixels can't change their colors fast enough to keep up with your game. This results in a smearing effect, where bright lights against dark backgrounds appear to have trails, and a quick turn might leave a fading "ghost" image of what was previously on the screen.



Good for gamers



Bad for gamers



Good for gamers



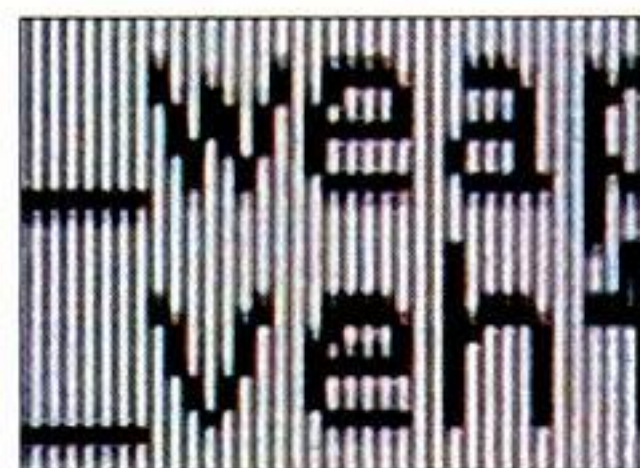
Bad for gamers

BRIGHTNESS/CONTRAST

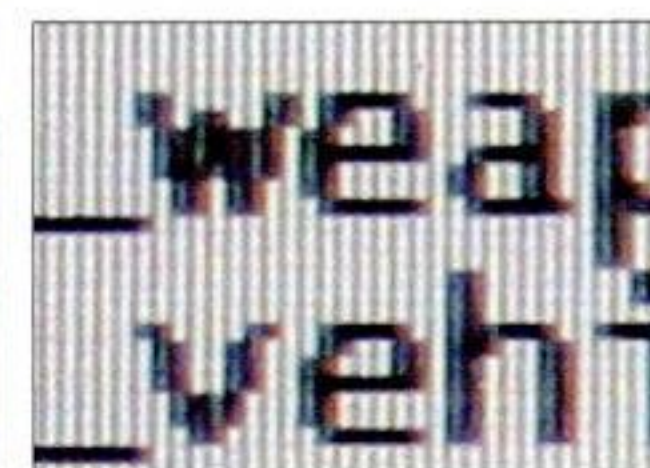
First- and second-generation LCDs were notorious for lacking brightness and contrast. Even today, only the very, very best LCDs can match the luminance of a CRT.

INTERPOLATION

Running games at anything other than the monitor's native resolution results in interpolation. The game expects to draw a red pixel at point A, for example, but point A falls in a spot where there are actually three fixed pixels at that location. An algorithm must decide where to put the red pixel, and what color or colors to use to fill the other pixels.



LCD at native 1600x1200



LCD interpolated to 1280x1024

NEC/MITSUBISHI LCD1980SX-BK

SPECIFICATIONS

19" viewable area
1280x1024
native resolution
DVI/VGA interface
0.29mm pixel pitch
\$850 (street price)
www.necmitsubishi.com

MEASUREMENTS

16.25" across
13.25" down



Despite the novel option to swivel the LCD into portrait mode, NEC's 1980SX-BK doesn't cut it for gaming. Images lost a tremendous amount of detail during quick movement, making fast-motion racing games and shooters a drag to play. At non-native resolutions, image quality suffered considerable degradation. We'd buy this extremely bright and sharp LCD in a heartbeat for illustration and editing work, but we'd go back to our CRT for after-hours fragging.

VIEWSONIC VP201S

SPECIFICATIONS

20.1" viewable area
1600x1200
native resolution
DVI/VGA interface
0.26mm pixel pitch
\$1,430 (MSRP)
www.viewsonic.com

MEASUREMENTS

17.5" across
13.5" down



At its native resolution of 1600x1200, the VP201s is *spectacular*, bright and crisp with nearly undetectable "ghosting" or blurring of images. Notch it down to 1280x1024, though, and everything onscreen looks as if it's been through a long, hard night. Additionally, the monitor setting default gave us annoying warning messages about using a non-optimal resolution. No kidding. If you're a single-resolution family, by all means, enjoy the Viewsonic. Otherwise—*next!*

KOGI L9CH-TA

SPECIFICATIONS

19" viewable area
1280x1024
native resolution
VGA interface
0.29mm pixel pitch
\$700 (street price)
www.gvision-usa.com

MEASUREMENTS

17" across
15.25" down



Kogi—not to be confused with the arctic menace Yeti—didn't fare well in our tests of the analog-only L9CH-TA. We saw considerable smearing in high motion, and only one judge would have even considered using the L9CH-TA as a gaming monitor. Similarly, interpolation introduced a severe penalty, where oncoming headlights grew long tails and began to resemble meteorites. Brightness and contrast were fine, but is that enough for gamers? No, it is not.

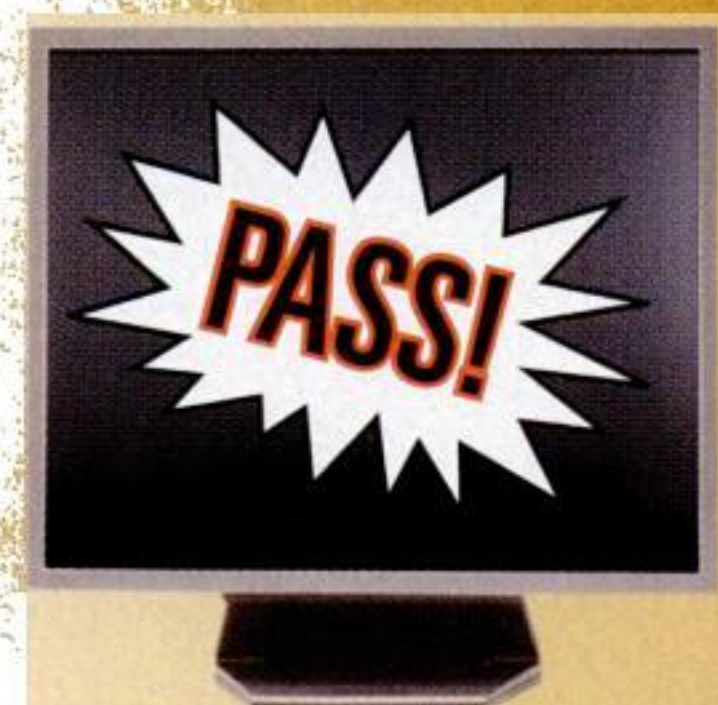
SAMSUNG 172X

SPECIFICATIONS

17" viewable area
1280x1024
native resolution
DVI/VGA interface
0.29mm pixel pitch
\$650 (street price)
www.samsung.com

MEASUREMENTS

14.25" across
11.5" down



One of the few LCDs in this challenge to receive a pass from every single participant, the 17-inch Samsung 172X dazzled us with both its high image-quality and slick design. Although there was some slight blurriness in *Need for Speed* compared with our test CRT, it wasn't obvious, and we were stunned at how little quality difference we could ascertain when playing at 1024x768 instead of the 172X's native res of 1280x1024. A mighty endorsement goes to the Samsung 172X for gamers of all stripes, everywhere.

PLANAR PL1700

SPECIFICATIONS

17" viewable area
1024x768
native resolution
VGA interface
0.26mm pixel pitch
\$460 (MSRP)
www.planar.com

MEASUREMENTS

14.5" across
12.5" down



Planar's PL1700 just barely squeaked by. The PL1700 showed slightly more blurring of light objects against dark backgrounds than the Viewsonic, but on the other hand, it did a much better job of interpolating pixels at lower resolutions. If you suspect that your rig won't be able to handle most games at their highest resolutions (a wise assumption in most cases), then the inexpensive analog-only Planar is an appetizing option.

DELL 2001FP

SPECIFICATIONS

20.1" viewable area
1600x1200
native resolution
DVI/VGA interface
0.26mm pixel pitch
\$900 (MSRP)
www.dell.com

MEASUREMENTS

17.5" across
13.5" down



Here's the ass-kicking external LCD to go with your ass-kicking Dell XPS notebook. All judges passed the massive, intimidating 2001FP with flying colors (literally). Only a very slight amount of blurring was detected in high-motion scenes with bright lights against dark backgrounds, even with interpolation at 1280x1024! At its native resolution, the 2001FP was among the sharpest and brightest LCD screens we tested. And at 20 inches of screen real estate, well, that's a whole lotta gaming goodness.

XEROX XL795D

SPECIFICATIONS

19" viewable area
1280x1024
native resolution
DVI/VGA interface
0.29mm pixel pitch
\$835 (MSRP)
www.xerox.com

MEASUREMENTS

16.75" across
14.75" down



We used the Xerox 900 to demonstrate to other people in our office what "ghosting" is. The Xerox was easily the worst offender of the group, with terrible blurring during fast motion that made the screen look like it was made of rubber and being pulled in different directions. Interpolation resulted in severe degradation of moving images. Although it's a large and handsome unit, the majority felt that the Xerox' brightness and contrast were vastly inferior to a CRT. We still like the company's copiers, though.

BENQ FP767-12

SPECIFICATIONS

17" viewable area
1280x1024
native resolution
DVI/VGA interface
0.26mm dot pitch
\$540 (MSRP)
www.benq.com

MEASUREMENTS

14.75" across
13.25" down



Bad news for BenQ. The FP767-12 didn't get a thumbs up from any of our editors. Blurriness was pronounced, making *Need for Speed* look like a film someone was trying unsuccessfully to pull into focus. Image quality took yet another big hit with interpolation. Even worse, most editors felt that the brightness, contrast, and color quality were inferior to even midrange CRTs. Oh well—thanks for playing!

MAXIMUM PC'S VERDICT

CRTs' multisyncing capabilities, which enable support for multiple resolutions, remain ideal for gamers, but it seems LCDs can no longer be dismissed outright. There

isn't a single editor on staff who wouldn't be happy cradling the Dell 2001FP, Samsung 172X, or Planar PL1700 on the way home to play *Battlefield: Vietnam*.

Of course, there's a lot more to LCDs than just gaming performance. Check back next month for a full review of the three LCDs that passed our Challenge. ■

Ask the Doctor

Symptom ► Diagnosis ► Cure

CAN YOU HEAR ME NOW?

My PC has an Asus A7N8X Deluxe mobo with an Athlon XP 2700+. I'm considering adding an Audigy 2 soundcard to my system, but I wonder if I will hear and see any sort of performance difference compared with the nForce2 onboard audio. Will I get faster frame rates?

—VICTOR KNIGHT

The Doctor generally recommends add-in soundcards over onboard audio except when there's an nForce2 involved. While most onboard audio is host-based, and thus soaks up CPU cycles, the nForce2 features true hardware acceleration, so you're not likely to see any advantage at all to using an add-in card.

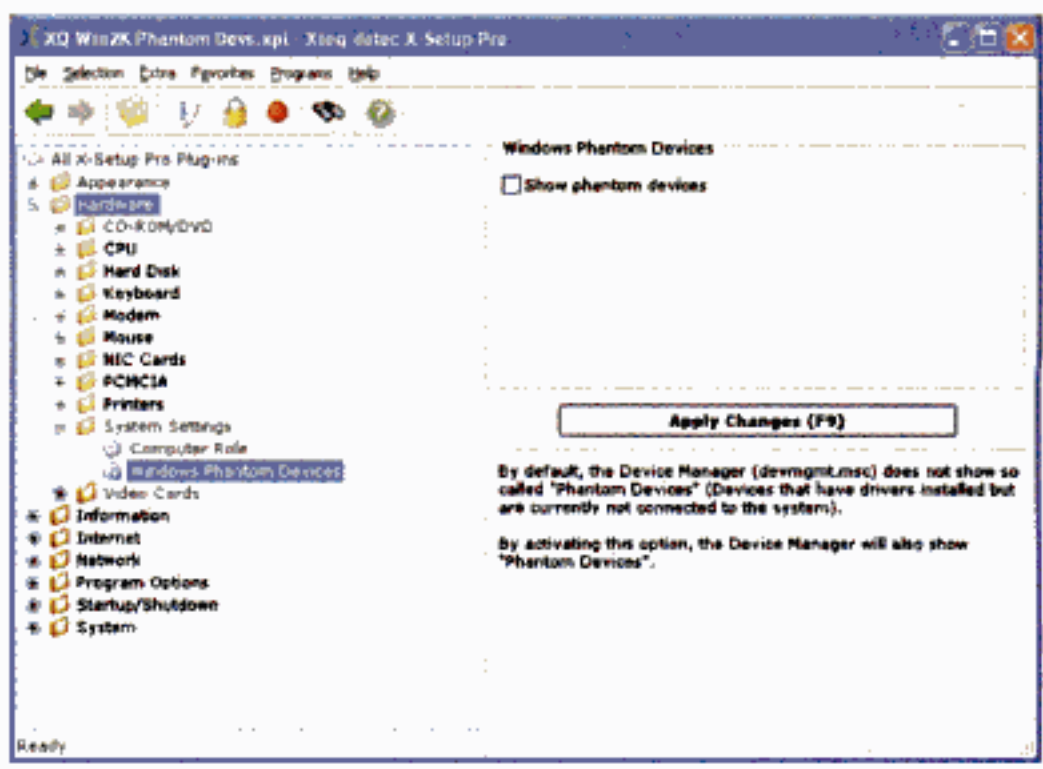
The nForce2's MCP-T south bridge chip is also the only product on the market that encodes audio, including DirectSound3D, to Dolby Digital. However, there may still be reason to upgrade to an Audigy card. Creative's Audigy 2 ZS uses components capable of 24-bit audio and uniquely includes hardware security that lets you play DVD Audio discs. The Audigy 2 ZS also lets you run eight-channel audio versus the six-channel audio of the A7N8X Deluxe. To the Doctor's ears, the

ASK AND YE SHALL RECEIVE

I use Windows 2000 on most of my computers. Are there *PowerToys* available for that version of Windows? If not, will *PowerToys* for another version of Windows work with 2000? Are there other sources for free programs like *PowerToys* elsewhere?

—REV. RONALD F. WALTERS, OFM

We've got good news and bad news for you, Reverend. There are no specific *PowerToys* for Windows 2000 with the exception of *TweakUI*, which is actually the most useful of them all. The NT version is labeled *Tweak UI 1.33* and is available at www.microsoft.com/networkstation/downloads/PowerToys/Networking/NTTweakUI.asp. The XP *PowerToys* are not designed to work with earlier versions of Windows. We've heard of people having some success running the XP utilities on Win2K, but have not confirmed this ourselves.



X-Setup lets you change a wide array of Windows settings, without any risky Registry editing.

A tweaking utility we can vouch for though is X-Tek's *X-Setup*, available at www.X-Setup.net. It offers a dizzying assortment of hidden tweaks and system settings, and is supported by all versions of Windows. The latest version is *X-Setup 6.5*. Like *PowerToys*, *X-Setup* is free software.

Thing is, I don't experience this problem when I use a joystick.

—LYNN ROBERTS

The Doctor had this exact same perplexing problem when he first started playing *Battlefield 1942*. The solution is simple: Try unplugging your joystick

with a newer version. If you use an upgrade version of Windows XP on a blank system, Windows will prompt you to insert a valid Windows 98, ME, or 2000 disk near the beginning of the install process, but that's only to identify the previous version, not to install it.

WINDOWS XP ACTIVATE!

I am always tweaking my computer with hardware upgrades. Now it's reached a point where whenever I make a hardware-related change to something in my computer, I have to reactivate my copy of Windows XP. This was fine the first few times when I could do it online, but now I have to call to get the activation code. I know this is to prevent piracy and to prevent users from loading the software on more than one computer, but I'm always making some type of change to my computer and it's getting rather annoying. Is there any way around this?

—JEFF MOORE

Unfortunately, there's no legitimate way around Windows XP's product activation. But we're curious how

frequently you're upgrading your hardware to encounter constant reactivation requests?

On our test systems, the only way we can force a reactivation request is to upgrade a lot of hardware. For instance, we've seen activation requests when we upgraded more than two of the following: motherboard, CPU, network card, and hard drive. Even *Maximum PC* editors stick with a system for at least six months.

LABEL THIS 'ANSWERED'

I read an article online recently that said marking the label side of a CD or DVD with a Sharpie marker could eventually damage the disc because the ink could eat through the label layer and damage the data layer. Is there any truth to this? What should I use to label my optical media?

—THEREALDEAL

If you were to ask a chemist (the Doctor knows a few), she'd probably advise you to use an oil-based marker, because the alcohol-based variety (like the classic Sharpie permanent ink pen) might dissolve the lacquer coating of the disc surface over time,

DURING A GAME, MY CHARACTER WILL RANDOMLY SPIN AROUND IN CIRCLES AND I END UP SHOOTING AT MY OWN FEET.

24-bit sounds cleaner than the A7N8X Deluxe when using high-resolution samples. For most material, you'll probably never notice the difference.

MOUSE HUNT

Whenever I'm working on my computer, my mouse cursor will decide to run off on its own, usually to the top corners of my desktop. During a game, my character will randomly spin around in circles and I end up shooting at my own feet. I've tried different mice, all of my USB and PS2 ports, and nothing helps.

when you're playing games that don't require it. Odds are that something is knocking the joystick off-axis and causing your uncontrollable spin.

INSTALLING WINDOWS XP FROM AN UPGRADE CD

Can I do a full install of Windows XP on a clean hard drive if I use an upgrade XP version? I want to start from scratch with a new drive and not have to install Windows 98 first.

—RICK LEES

You never need to install an older version of Windows in order to upgrade

thus changing its reflectivity and ruining the disc.

That said, we've used alcohol-based Sharpie pens ever since we got our first wind-up CD burner, and not a single editor has ever had a problem with a disc that he or she would attribute to ink damage. If you're really worried about the longevity of a disc, stick with pens that are either oil-based or clearly intended for optical disc use (and stay away from adhesive disc labelers; even a slightly misaligned label can ruin a disc). But paying a premium for special CD markers reminds us of a time when we nervously paid eight bucks for "cassette head cleaner," when rubbing alcohol—likely the sole ingredient—could be purchased for about \$1 per 16 ounces at our local drugstore.

VARIABLE VS. CONSTANT BIT RATE MP3S

I'm looking to rip my entire CD collection so I can use my PC to listen to several hours of music without having to swap CDs. And I'd like to be able to transfer a selection of songs to an MP3 player for listening to while on the go. I've heard that ripping using a variable bit rate offers the best quality, but that ripping using a constant bit rate ensures the best compatibility with MP3 players. Is that still true of today's newer MP3 players? I'd be looking to buy either an Apple iPod or a Creative Labs MuVo NX.

—MARC WAUGH

You heard correctly, Marc. Bit rate refers to the amount of information recorded for every second of audio. The higher the bit rate, the closer the sound will be to the source audio. Constant bit rate recording (CBR) captures the same amount of information throughout the entire song, be it 128Kb/sec, 160Kb/sec, or higher. Variable bit rate recording, on the other hand, throttles up the bit rate during complicated parts (loud, distorted guitars, orchestras, that kind of thing) and lowers the bit rate during less complicated passages (like silence, for example). The purpose of variable bit rate encoding is to reduce the size of an audio file as much as

SAVING PATCHES AND HOTFIXES FOR LATER

I have a question about patches and hotfixes. I thought I could download all the patches to a directory and apply them whenever I wanted. Instead, the apps always install themselves at download, and I have no idea how to save them for some future date when I may wipe my hard drive, reinstall Windows, and then reinstall all the fixes without having to download them again. Is this possible and if so, how?

—JOE ZINSKIE

You need to visit the Downloads section of Microsoft.com, click the "Windows (Security and Updates)" option on the left side of the page and download all the updates listed (you'll need to click the "Next 45" link to see them all). The Doctor recommends you download all the security updates for your version of Windows to one folder. After you've done that, you can save them to CD, DVD, or whatever format you'd like for future use.

Windows (Security & Updates)

Most Popular Downloads

1. MyDoom (A, B) and Doomsday (A, B) Worm Removal Tool (KB835528)
2. Security Update for Windows XP (KB823980)
3. Internet Explorer 6 Service Pack 1
4. Blaster Worm Removal Tool for Windows XP and Windows 2000 (KB833330)
5. Cumulative Security Update for Internet Explorer 6 Service Pack 1 (KB832894)
6. Next 45
6. Security Update for Windows XP: KB828028
7. Security Update for Windows 2000: KB828028
8. Security Update for Windows XP 64-Bit Edition (KB823980)
9. Security Update for Windows 2000 (KB823980)
10. Security Update for Windows XP (KB824146)
11. Cumulative Security Update for Internet Explorer 6 (KB832894)
12. Security Update for Microsoft Windows 98 and Windows 98 Second Edition (KB823559)
13. Windows XP Home Edition Utility: Setup Disks for Floppy Boot Install
14. Software Update Services 1.0 with Service Pack 1
15. Windows XP Professional with Service Pack 1 Utility: Setup Disks for Floppy Boot Install
16. Windows 2000 Service Pack 4 Network Install for IT Professionals
17. Security Update for Windows NT Workstation 4.0: KB828028
18. Cumulative Security Update for Internet Explorer 6 Service Pack 1 (KB824145)
19. Security Update for Microsoft Windows XP: KB828035
20. Internet Explorer 5.5 Service Pack 2 for Windows Me
21. Security Update for Windows NT Server 4.0: KB828028

If you find yourself frequently installing Windows on new machines, you can save yourself a lot of downloading hassle by keeping copies of all the Windows patches on a CD.

possible while still maintaining good audio fidelity.

We strongly recommend variable bit rate recording. But you're right to be cautious about VBR support in portable players. For example, Apple's iPod and Creative Labs' MuVo NX support VBR-encoded MP3s but older players may not.

THE DEAL WITH AGP PRO

I just bought a Soyo SY KT400 Dragon Ultra Platinum mobo and it's pretty sweet. There's just one problem: There is a power connector next to the AGP Pro slot that I don't know what to do with. I looked on Soyo's web site and it simply states: "This plug is for supplying extra power to your AGP Pro videocards only. You should not plug in a connector from your power supply."

What is the connector for, and how can you tell if you have an AGP Pro card or not? I'm currently running an MSI GeForce4 Ti 4600 8x AGP card. Nowhere on the box can I find the word "Pro," so can I assume that my card is not a Pro?

—JOHN CARRIGAN

Some super-specialized, high-end workstation videocards require more electricity than a standard AGP slot provides. Your motherboard has an extra power connector so the videocard's power requirements don't tax the rest of the system. Your videocard is definitely not an AGP Pro card, so you don't need to worry about it at all.

WHY ALL THE DRIVES?

I'm running an Intel P4 system with seven drives: one DVD, one CD-RW, one 80GB ATA133, two 120GB ATA133, and two 160GB Serial ATA. My system keeps restarting randomly ever since I added the last two Serial ATA drives. What's the minimum wattage power supply I should have? And what manufacturer would you recommend?

—CHRIS

It certainly sounds like you have finally reached the wattage limit of your power supply. With five hard drives and two opticals (not to mention a high-wattage CPU and videocard), you'll probably want no less than 450 watts and preferably from a reputable vendor. PC Power and Cooling offers one of the best power supplies on the market with its TurboCool 475 Deluxe. If you're a little money shy, consider an Antec or Enermax PSU. Just make sure the system is kept cool. As the temperature increases, the power output from the power supply decreases. ■

SECOND OPINION

POWER TRIP

I was just reviewing my October 2003 issue and noticed your suggestions about power supplies and power strips. I have a bone to pick with you: You should never recommend a power strip for your PC. If you look closely at a power strip, most have a circuit breaker designed to protect the wall socket and wiring but not the PC. And most of those cheap strips have little or no surge protection, not to mention noise suppression, etc. When talking about PC protection to anyone, I recommend a good battery-backup unit that not only provides battery backup when the power goes out, but that also protects during brown outs, suppresses line noise, offers surge protection, and a modified sine wave. Good units start at about \$40, while a very good surge strip is just a few dollars less. In the last few years, I've solved many PC problems with a good backup unit.

These days, if I come across system problems, I check to see what kind of power protection it has first. If a PC doesn't have a good backup unit, I install one before I do anything else.

—JEFF NOTT

Wherever a PC is not working. Wherever a game won't run. Wherever a driver won't install, the Doctor is there. If you need him, look to the sky and whistle. If that doesn't work, send an e-mail to doctor@maximumpc.com. Remember, the Doctor cannot answer every e-mail, nor hear every plea for help; only those that are run in the magazine.



How To...

A step-by-step guide to tweaking your PC Experience

MAXIMUM PC
TIME TO COMPLETION
2:05
HOURS MINUTES

LEARN Visual Basic PROGRAMMING

There's no secret to writing good code

BY BRYANT BRABSON

Basic computer programming isn't rocket science. In fact, with the right tools, anyone can write handy, reliable programs. All you need is a logical, structured approach—and our help. Does your commercial software collection lack a certain something? Or maybe you want to generate a little

DISCLAIMER:
You may find this
article so interesting you
take up programming.

extra cheddar as a freestyle software developer? *Maximum PC* will be your guide. We're going to get you started by writing a simple command-line cryptography program using the programming language Visual Basic .NET. The result will be a small app that encrypts a message typed from a makeshift command line.

1 Get your tools

All you need to write Visual Basic code is either a stand-alone copy of Microsoft *Visual Basic.NET* or *Visual Studio.NET 2003*. You can either order a 60-day trial DVD or try the software online using your broadband Internet connection. Information explaining how to do both can be found at <http://msdn.microsoft.com/vstudio/productinfo/trial/>. We also like to keep Michael Halvorson's *Microsoft Visual Basic .NET Step by Step* handy. It's a great beginner's guide to programming in VB.

One more thing: You should bookmark the Microsoft Developer Network at <http://msdn.microsoft.com/>—it's a useful reference. It will help if you open the source code for the app we're discussing while you read through this month's How-To. The complete Visual Basic project file and code are available on the Extras section of our CD-ROM or at www.maximumpc.com.

2 Create your project

Open up the *Visual Studio 2003* Integrated Development Environment (IDE). Create a new project (click File, then New, then Project). Don't sweat the dizzying array of choices you'll see, just make sure Visual Basic Projects is selected on the left under Project Types; on the right side of the dialog box under Templates, choose the "Console Application" option. We'll forego a catchy moniker for our program and simply call it "MaxPC01." Once you click the OK button, *VS2003* will create a new directory in the My Documents\Visual Studio Projects folder. This directory will have the same name as your project and will contain all the files that make up your application.

Focus your attention on the right side of the IDE; you'll see that the Solution Explorer displays a new Solution named MaxPC01. A Solution is nothing more than a group of

projects. You should see that the MaxPC01 Solution currently has one Project, also named MaxPC01. Right-click the Project, and select Properties. The MaxPC01 Property Pages dialog will appear. Under Common Properties, select Build, ▶

DEFINING TERMS

PROJECT

A container for Visual Studio source code files.

SOLUTION

A container for one or more Visual Studio projects.

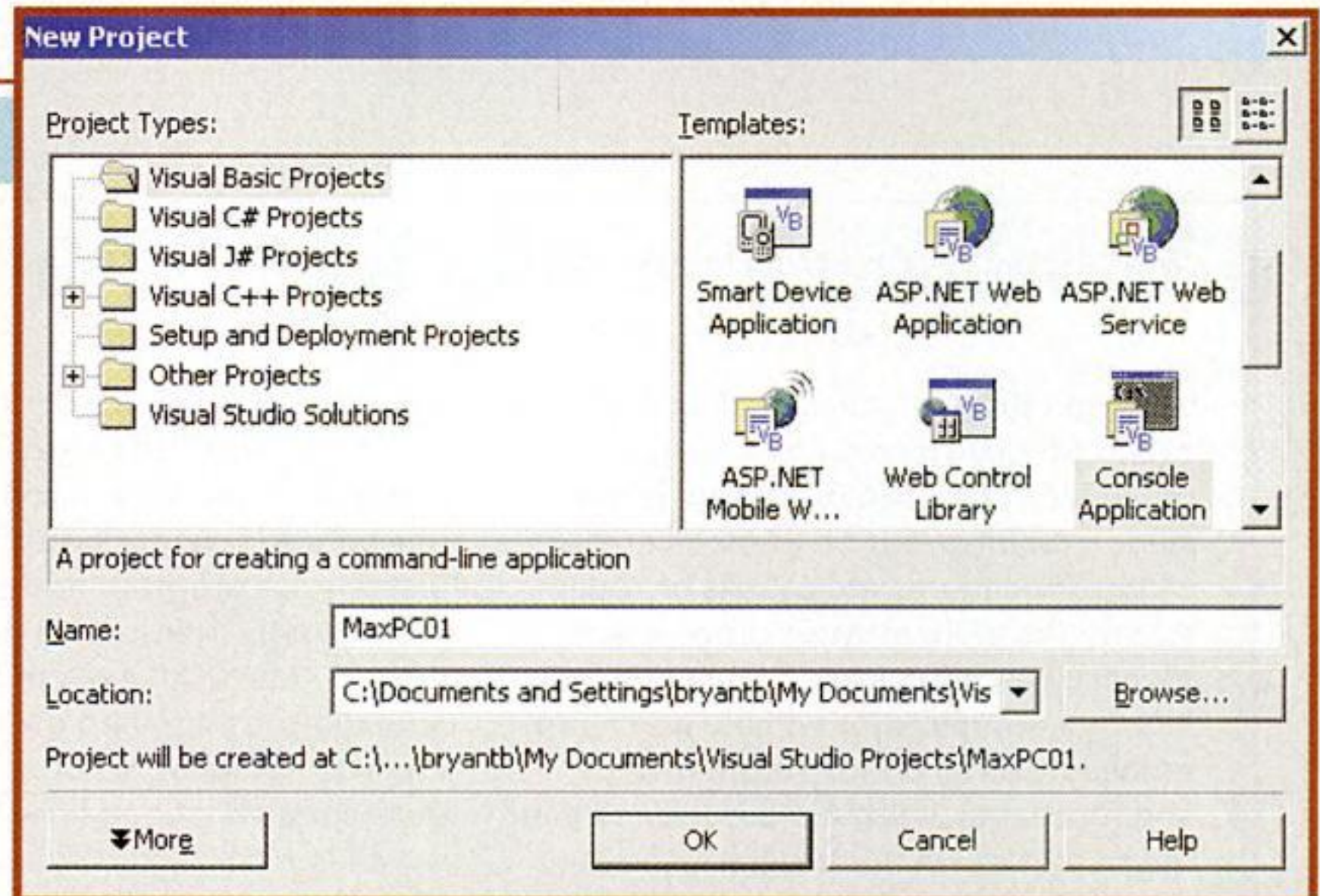
STRING

A sequence of alphanumeric characters. Strings can also contain spaces and special characters.

2 Create your project (continued)

and make sure the Option Explicit and Option Strict combo boxes are both set to "On" and that Option Compare is set to "Binary."

Option Explicit requires that you declare all your variables before using them. We do this to prevent subtle yet frustrating bugs that arise when a variable name is misspelled. Option Strict requires that you explicitly convert one type of data to another as well as declare a variable's data type. Option Compare's binary setting ensures that string data types—strings are sequences of alphanumeric characters—are not compared as case-insensitive text. With Option Compare set to "Text," the program thinks AAA and aaa are the same, which can cause problems. It may seem goofy, but it's important to do this stuff for every program so that you write clean, bug-free code. It will definitely save you from headaches down the road!



Make a mental note of the location of your new project or it will be harder to find than Dick Cheney's "undisclosed location."

3 Write your first line of code

With the project created, we're ready to cross the virtual Rubicon and write some code.

In the Solution Explorer (located under your MaxPC01 project) you should see a file named Module1.vb. More likely than not, VS2003 opened this file for you and displayed it in the code editor of the IDE when you

created your new project. If it is not open, double-click the file name in the Solution Explorer, or right-click and select Open or View Code.

Looking at the first line of code, you might correctly deduce that Module1.vb is known in Visual Basic.NET (VB.NET) as a "module." A module is simply a container for lines of programming

DEFINING TERMS

MODULE

A container of code such as procedures, variables, and constants.

PROCEDURE

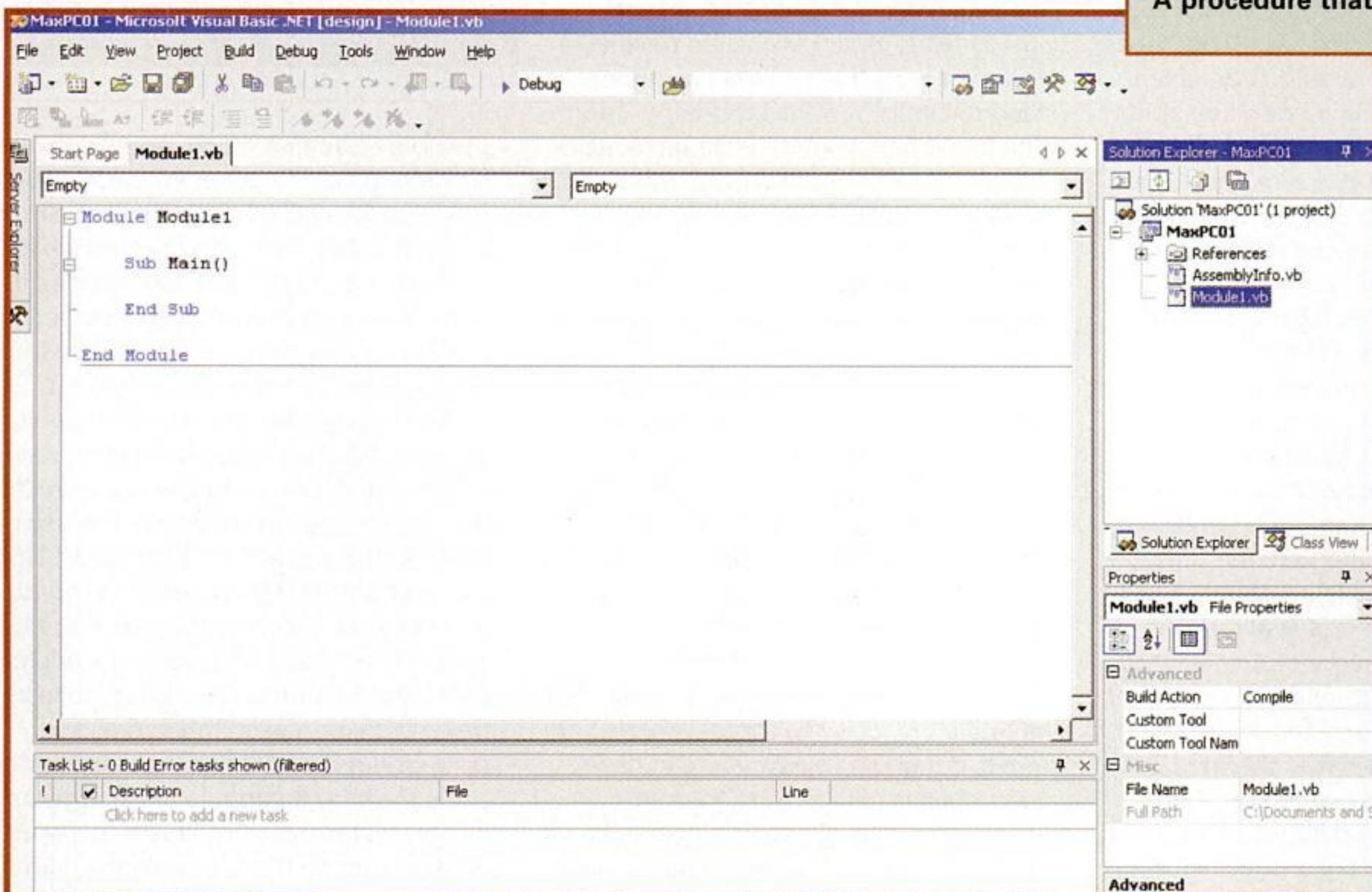
A named block of code that performs an action.

SUBROUTINE

Also known as a "sub," it's a procedure that doesn't return a value.

FUNCTION

A procedure that returns a value.



The empty expanse of the code editor window is understandably intimidating to most who encounter it, but *Maximum PC* will hold your hand through every step of the coding process. Stick with us and you'll be programming in no time!

3 Write your first line of code (continued)

code, but this particular module is interesting because it contains the main procedure. The main procedure is the starting point of our hand-made application. Procedures are chunks of code that do the work for your programs. In VB.NET, procedures are further divided into two groups: subroutines, which are procedures that do not return a value, and functions, which are procedures that return a value. In our program, the main procedure starts with the line "Sub Main"

and ends with the line "End Sub."

You'll create lots more of these procedures as you write programs. You'll use subroutines for housekeeping inside your program and for functions that actually manipulate data. Once you type in "MaxPC01.exe" at the command line, the program begins execution in the Main procedure. Our main procedure consists of one line, MainMenu(), which is a call to the subroutine MainMenu. What this means is that

```
Sub Main()  
    MainMenu()  
End =
```

▲ **This is the main procedure—the starting point for our program. It runs just the MainMenu() procedure, which calls up the subroutine MainMenu.**

when your program starts, the code inside the MainMenu() function will be immediately executed.

4 Assemble the program pieces

Now, let's take a look at the code in the MainMenu() procedure. You might have noticed that this procedure's name is preceded by the word "Private." This denotes the procedure's Accessibility, or its visibility to other parts of the program. There are five accessibility levels in VB.NET, but we will only deal with two of them—public and private. By default, a procedure declaration with no accessibility modifier is Public. Main() falls into this category. Because it is public, it can be called up from code outside of its containing module. This makes sense if you remember that Main() is the code where execution begins in this program. If Main() had been declared Private, you wouldn't be able to access it and therefore wouldn't be able to start the program. That would make all this code about as useful as a one-legged man in an ass-kicking contest. MainMenu is Private, so it can only be called from within this module.

Any line that begins with a single quote (') in VB.NET is a comment. This means it will not be treated as code, so it's a good way for you to leave notes to yourself—or to others. (We've left comments throughout the source code for this app explaining how each line of code works.) The first line of the MainMenu procedure is a comment telling you that the next line is a variable declaration of string type that is used to hold user input. A variable is a value that can change, as opposed to a constant, which is a value that never changes. In VB.NET, variables and constants are defined as specific data types using the "As" keyword. There are a number of data types, but we need just a few for

our program. If you declare a variable you must also assign a type to it. If you don't, you'll get a nasty error when you try to build your program because we set Option Strict to "On" earlier.

Two lines down from the sInput declaration you'll see the word "Do." Scan down the page until you see the words "Loop Until." These two lines and all the lines in between comprise a block of code known as a Loop statement. This block of code will repeat until the condition specified by Loop Until is true. Another way to look at it is that the code will loop while the condition in Loop Until is false. In fact, we could have written it that way, but it's easier to understand using its current condition: "Loop until the variable sInput is equal to QUIT."

How does sInput become equal to the word "QUIT"? The answer lies in the first few lines of the Loop statement. The two lines that begin with the word "Console" prompt the user to type in a response on the command line. The line of code "sInput = Console.ReadLine()" reads that input into the variable sInput.

Now let's introduce a new concept: Methods. Methods are the same as procedures except they perform actions on an object and that object's data. "Console" refers to the console object, which is a class that, in our program, represents your command line. A class can be thought of as a blueprint for a house, while the object is the actual constructed house. Put another way, you can have many objects spawn from the same class. Notice that the word Console has a period and then a procedure name such as "ReadLine," which is a member of the

DEFINING TERMS

VARIABLE

A named memory location representing data that can change during program execution.

CONSTANT

A named memory location representing data that *cannot* change during program execution.

LOOP

A block of code statements that repeats until a condition is met.

METHODS

The procedures associated with an object.

Console class that reads input from the command line. To get even more specific, ReadLine is a public method of the Console class. Remember what Public indicates? It means you can use ReadLine to read user input from the Console. If it had been marked private, we would not have access to it and couldn't use it.

You're probably starting to understand what is going on in the MainMenu Loop statement: We're going to keep executing the code inside the loop until the user types in the value "E", "D", or "QUIT". If the user enters "QUIT" we're going to exit the loop and the program. If the user types "E" or "D", we're going to call the CipherMenu subroutine, which collects the information used to encrypt and decrypt our data. Notice that CipherMenu takes the sInput variable as an argument or parameter, which means that sInput is data used by the CipherMenu sub to perform some action.



WHERE WERE YOU WHEN THE PERSIANS STORMED THE BEACHES OF NORMANDY?

THE PC GAME OF THE YEAR JUST GOT BETTER.



Rise of Nations®: Thrones & Patriots Expansion is here. Now you can lead one of six diverse new nations into battle, including the Americans, Dutch, Indians, Iroquois, Lakota and Persians. Or you can lead the charge in four historical single player campaigns: "Alexander the Great," "Napoleon," "The New World" and "The Cold War." The expansion also offers more than 20 new units, including massive Persian war elephants and American marines, and adds governments to the original game. Every decision and detail counts, as you change history, control man's destiny and craft the perfect plan for world domination.



Blood and Gore
Violence

MAKE HISTORY

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5 Add a little cryptography

Our program needs to collect two pieces of information before it can encrypt or decrypt anything in the CipherMenu. First, we need to get the encryption/decryption key from the user, which the GetKey function will do. Second, we'll use the GetInputText function to capture the text to be encrypted or decrypted. These two functions have the same structure: They will declare variables, loop until the user enters the requested data, and then return the data to the calling procedure, which is the subroutine CipherMenu.

We're now ready to make a foray into the realm of object-oriented programming (OOP). The Cryptography object shall be our guide.

In the Solution Explorer right above Module1.vb you should see a file named Cryptography.vb (displayed below). Open this file in the code editor by

double-clicking the file name or right-clicking and selecting View Code. You'll notice that the structure of a class is very similar to that of a module. Classes and modules both use the same data types and the same syntax for subs and functions, but there is one big difference between the two. Classes can be instantiated as objects; that is, we can create as many instances or occurrences of a class during program execution as we want. Each object that you instantiate has its own separate copy of the class data, even though it shares the same class definition. Example: If you alter the value of variable X in object 1, the value of variable X in object 2 remains unchanged. You can't do this with modules—only one instance of a module exists while a program is running. Plain English: We could create 1,001 Cryptography objects if we wanted but

```
Private Function ShiftCipher(ByVal sInput As String, ByVal iKey As Int32) As String
    Dim iAsciiCode As Int32
    Dim sbOutput As New System.Text.StringBuilder
    Dim aChar() As Char

    aChar = sInput.ToCharArray()

    For i As Int32 = 0 To aChar.GetUpperBound(0)
        iAsciiCode = Asc(aChar(i))

        If (iAsciiCode > 31) And (iAsciiCode < 127) Then
            iAsciiCode = ((iAsciiCode - 32 + iKey + 95) Mod 95) + 32
        End If
        sbOutput.Append(Chr(iAsciiCode))
    Next
    Return sbOutput.ToString()
End Function
```

▲ The ShiftCipher function is the workhorse of our program. It uses a loop to modify each character of the message you type, and then it writes the new, encrypted value to the sbOutput variable. The indentations function as a hierarchy for your code, organizing it so you can parse it easier.

DEFINING TERMS

CLASS

A named entity composed of related data and the methods that act on that data. A class is to a blueprint as an object is to a house.

OBJECT

An instance or occurrence of a class that has been acted upon during program execution. Think of a cookie cutter as the class and the cookies as the objects.

only one Module1.

So what's the big deal about classes? Why not just write another module every time we want to do something new? Classes promote code reusability and organization. If we want to rewrite our console application as a Windows app, all we have to do is build a user interface, then copy our Cryptography class to the new project. We don't have to reinvent the wheel every time we need to write a new program.

For our program, we *must* create an instance of our Cryptography class before we can use it to encrypt and decrypt our text. We do that with the line

```
Dim oCrypto As New Cryptography
```

in Module1's CipherMenu subroutine. Every time our program encounters this line of code, a new object is created, and the program can then call the procedures inside the Cryptography class. In contrast, we don't have to do anything to use Module1's procedures—we just call them and they do their thing.

The oCrypto object uses a numeric key to work its magic and has a private variable named m_iKey to store this value until it's used. However, it's very bad form in the object-oriented programming world to directly manipulate an object's variables from outside that object. In the case of m_iKey, we can't anyway, because the variable is private and inaccessible. Fortunately, objects provide gateways to their internal values by using programming constructs called Properties. Like variables, properties are assigned a data type. The property's data type corresponds to the data type of the variable that the property represents. In our program, the Cryptography class has a property named "Key of type Int32," through which we can either set or get the value of the m_iKey variable, which is also of type Int32. ►

5 Add Cryptography (continued)

Now that the Key property has been set, we're ready to use oCrypto's encrypt and decrypt methods. Both methods require a string input parameter representing plaintext or ciphertext, and both methods return either encrypted or

decrypted text. The code for these methods is almost functionally identical except that the decrypt method passes the negative value of Key to the ShiftCipher method. ShiftCipher is the hardest working method in this application as it

handles both encryption and decryption duties. ShiftCipher sends its string data type back to whichever method called, and then, faster than you can say "Randy Waterhouse," you've got encrypted or decrypted text on your command line.

6 Wrap it up

Whew—we've covered a lot of ground! If you'd like to get more information on all the concepts we've introduced, search Microsoft's MSDN site or Google. The Visual Basic Resource Kit also has a lot of great information.

On the other hand, if you're already seeing areas for improvement in the sample code, or if you want to experiment with the code, you should feel free to get your hands dirty. One of the nice things about object-oriented programming is that you can easily change the implementation of a method without breaking the entire program. This is known as "encapsulation." If you find a more efficient or more secure encryption algorithm, you can just change the

code inside the encryption method, rather than rewrite the class or recode the entire application. As long as the method name and the input and output values are the same, no one will ever know that the implementation has been changed. As long as you have a backup of the original code, you can't destroy anything.

Finally, don't forget that programming offers ample opportunity to show your creative side—or your personality. Just as there is more than one way to skin a cat, there is often more than one solution to a problem. Dare to be different. Take a walk on the wild side. You'll be surprised at what you can accomplish. ■

Tell us what you think?

This is the first programming How-To we've tackled, and we intend it to be just one in a series. In a few months, we'll attach a GUI to our crypto app. In the meantime, we'd love to hear your thoughts on this article. Or maybe there's another How-To story you're dying to see? We're always listening at howto@maximumpc.com.

30 MINUTE How To...

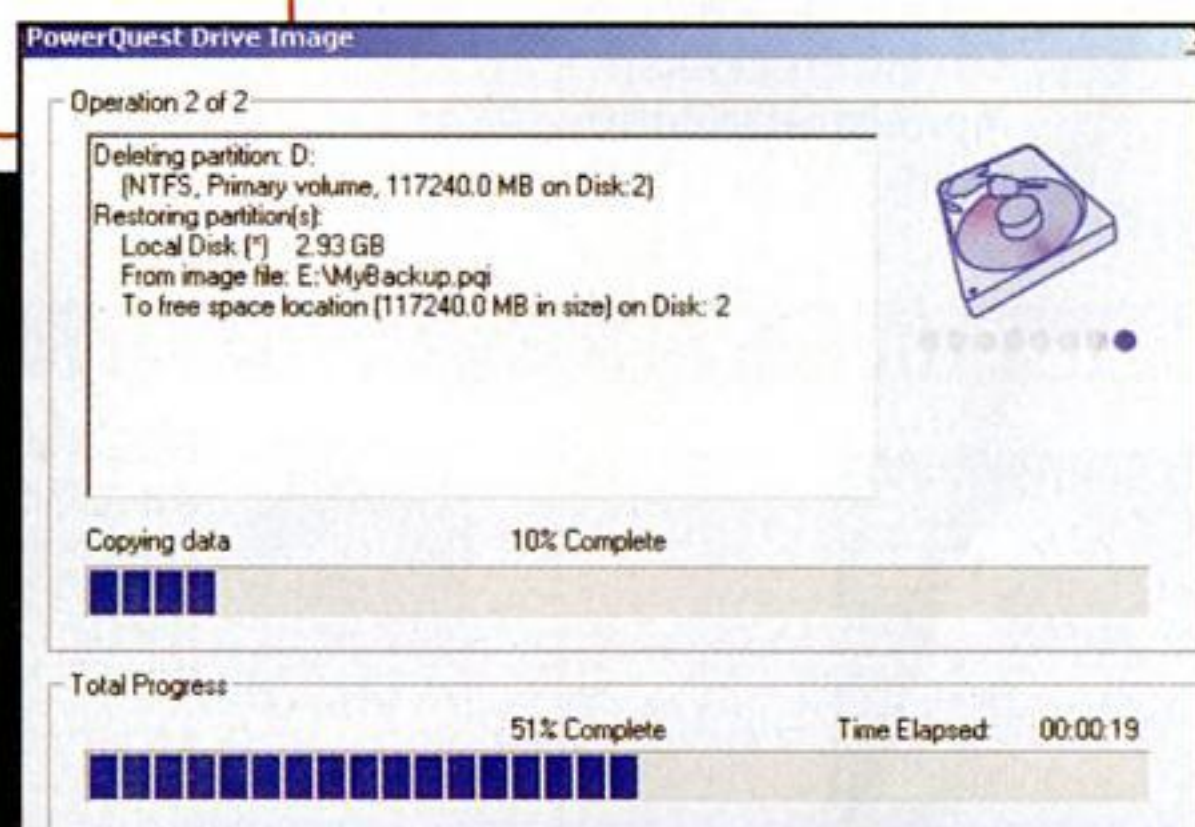
UPGRADE TO A BIGGER HARD DRIVE

There are two ways to transfer all the content from your current hard drive to your new, bigger drive: the easy way and the hard way. The hard way is to simply reinstall everything piece by piece. First you install the OS, then Service Pack 1, then every damn Windows hotfix, then drivers for all your hardware, and finally all your files individually. While this is the best way to ensure a "clean" install, it's so time consuming that we cringe at the thought of it. Of course, if your current installation is FUBAR or chock-full of ballast, a clean install is the best course of action.

If you're a conscientious computer user, though, and have a rea-

sonably snappy install in place, you can do things the easy way and use a hard drive imaging program. An imaging program can transfer your entire drive's contents as a single file to a new hard drive, leaving your OS, applications, games, and all other files completely intact. PowerQuest's *Drive Image*, Acronis' *True Image*, and our favorite, *Norton Ghost*, are all excellent for this purpose, and also include a "drive copy" function that makes the procedure totally painless. The process is simple:

- ▶ Install imaging software on your current hard drive.
- ▶ Install the brand-new hard drive in your system, either on a separate ATA channel or as a slave on the primary drive's channel.
- ▶ Clone your primary drive to the new drive. Some programs, such as *Ghost* and *Drive Image*, can copy directly from one drive to another. Other apps will



All of today's drive-imaging apps work with parallel ATA drives, but can have problems with SATA drives (see page 68).

first make an image of your drive and then move the image to the new drive. If you don't have a spare hard drive partition or external drive on which to temporarily store this image, you can span the image across multiple CD-R or DVD-R media. Once the data has been transferred, your new drive should be a clone of your old drive.

- ▶ Now format the old drive and use it for storage or, better yet, backup!

—JOSH NOREM



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64-bit Processor
Model# ADA3000BOX

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Athlon™ 64 3400+
1MB L2 Cache
64-bit Processor
Model# ADA3400AEP5AP
OEM



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Athlon™ 64 3200+
1MB L2 Cache
64-bit Processor
Model# ADA3200AEP5AP
OEM



\$211.00

Athlon™ 64 3000+
512KB L2 Cache
64-bit Processor
Model# ADA3000AEP4AP
OEM

Motherboards



ASUS VIA K8T800
Chipset for AMD Socket 754 CPU
Model# K8V Deluxe

\$155.99



MSI VIA K8T800
Chipset for AMD Socket 754 CPU
Model# K8T Neo-FIS2R

\$124.00



Gigabyte nForce3 150
Chipset for AMD Socket 940 CPU
Model# GA-K8NXP-940

\$209.99

Video Cards



Sapphire ATI Radeon 9800 Pro 128MB DDR - OEM

\$212.00



Gigabyte ATI Radeon 9200 128MB DDR
Model# GV-R92128DH

\$67.99



EVGA nVidia GeForce FX5900SE 128MB DDR
Model# 128-A8-N321

\$188.00

Sound Cards



Creative Labs Sound Blaster Audigy2 ZS PCI Sound Card Model# SB0350

\$88.00



Chaintech 7.1 Channel PCI 24-bit/192KHz Model# CT-AV710

\$24.00



M-Audio 7.1 Channel PCI Dolby Digital 5.1 Model# Revolution 7.1

\$100.00

CD/DVD ROMs



Sony 16x DVD-ROM Drive Model# DDU1612/B2 OEM

\$32.00



Lite-On 16x DVD-ROM Drive Model# XJ-HD166 BLACK OEM

\$25.00



Samsung 52x CD-ROM Drive Model# SC-152GEBB OEM

\$18.00



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1MB L2 Cache
64-bit Processor
Model# ADAFX51BOX

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Athlon™ 64 FX-51
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Model# ADAFX51CEP5AK
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AMD Opteron™ Model 244
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Model# OSA244CEP5AL
OEM

\$411.00



AMD Opteron™ Model 244
1MB L2 Cache
64-bit Processor
Model# OSA244BOX

\$461.00



AMD Opteron™ Model 246
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64-bit Processor
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\$689.00

Memory



\$84.00

Kingston PC-3200 184
Pin 512MB DDR



\$80.00

Geil Value Series PC-3200
184 Pin 512MB DDR - OEM



\$84.00

Crucial PC-3200 184 Pin
512MB DDR - OEM

Hard Drives



\$70.00

Western Digital 80GB
Special Edition 7200RPM IDE
8MB Buffer Model# WD800JB - OEM



Seagate 120GB
7200RPM 8MB
Buffer Model#
ST3120026A
OEM
\$99.00



\$153.75

Maxtor 120GB OneTouch
External Backup
7200RPM
USB 2.0 Model#
A01B120

CD/DVD RWs



\$103.50

NEC 8x DVD±RW Drive
Model# ND-2500A - OEM



\$179.00

Plextor 8x DVD+RW
Drive Model# PX-708A/SW



\$33.00

Sony 52x32x52 IDE
Internal CD-RW Drive
Model# CRX230E - OEM



\$49.99

Ritek DVD-R
4x 50 Pack - OEM



\$40.00

Memorex CD-R
700MB 52x 100 Pack



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Activision
Call of Duty



\$24.00

Sierra Half Life
Platinum Edition 2



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In the Lab

A behind-the-scenes look at Maximum PC testing

Serial ATA Image Problem

Want to image your new SATA drive? Choose your imaging software very carefully

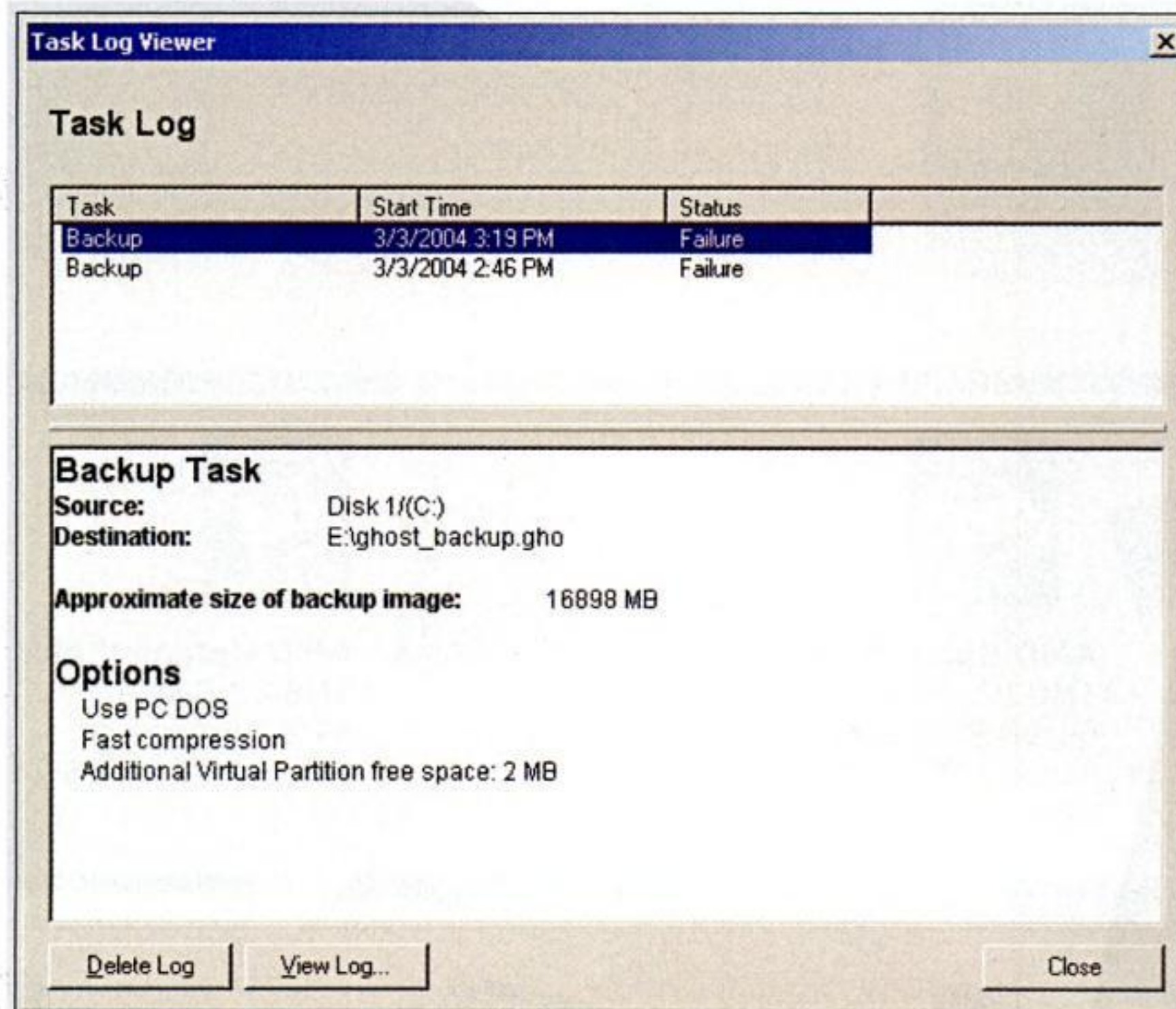
In the *Maximum PC* laboratory, every single one of our test systems has a partitioned hard drive, and on that second partition resides an image of our test system that's as pure as Mary Kate and Ashley Olson. When things go haywire on the main partition, the virgin image comes to the rescue.

Recently, lab personnel have been feeling kind of frisky; we've been trying to move this "pure as driven snow" image onto a Serial ATA drive in order to boot from it. Our attempts, however, have been largely unsuccessful. Naturally, we decided to investigate.

Drive Image = No Drive Image

Most of our problems started with the latest version of PowerQuest's *Drive Image*. Though *Drive Image* has been indispensable to us over the years, we simply couldn't get version 7 to work with a SATA drive at all. Our initial test consisted of making an image of our C:\ drive and placing it on the second partition of our main disk (E:\)—we had no problems performing this rudimentary task.

Next, we attempted to move that image onto our Maxtor 120GB SATA drive. The operation completed just fine with no errors, but when we tried to reboot from the Maxtor drive, our test rig would only endlessly reboot. At PowerQuest's suggestion, we tried the updated version of the software—version 7.03—but it produced the same results. Frustrated, we concluded that *Drive Image* 7 has serious SATA issues and moved on. One final note: Our PowerQuest contact told us the app definitely works with SATA drives, but when we called the company's tech support line, we were told that *Drive Image* doesn't support SATA. "Our position is 'if it works, great,'" the technician said. "But if it doesn't, there's not much we can do about it."



Using drive-imaging software with Serial ATA hard drives can be frustrating, as you can see from this Norton Ghost task log.

Norton Ghost Takes a Crack at the Problem

Discouraged but not disheartened, we tried another lab favorite: *Norton Ghost* 2003. We eventually succeeded in getting this imaging app to work, but it was tricky. We ran our initial tests using the onboard SATA controller of our 865GBF chipset, which has known problems with *Ghost*. According to Norton's technical support, the software has issues with the 865's interrupt controller, but we were also told that downloading the latest patch or using the 2003 version would fix the problem. This was definitely not the case. We attempted the same test we performed with *Drive Image* 7, and even used the command-line prompt "-FNI" to allow the software to communicate

with the SATA drive through the BIOS, but were unsuccessful; upon boot, *Ghost* simply locked up. After we switched over to a Silicon Image 3112 two-port PCI SATA controller, the software worked as advertised. (We still had to use the "-FNI" command prompt, however.)

Success at Last!

As a final resort, we fired up *Drive Image* 2002, and we're happy to report that we experienced no problems whatsoever—we even used the onboard SATA controller. We have yet to test Acronis' *True Image*—one staffer says he uses it with his SATA drives at home without incident—so stay tuned. But for now, the lesson is clear: If you want to move an image to a SATA drive, we advise using *Drive Image* 2002.

CardKeepers

What's the most likely source of PC failure when you truck your rig from one side of town to another? If you're thinking it's a crashed hard

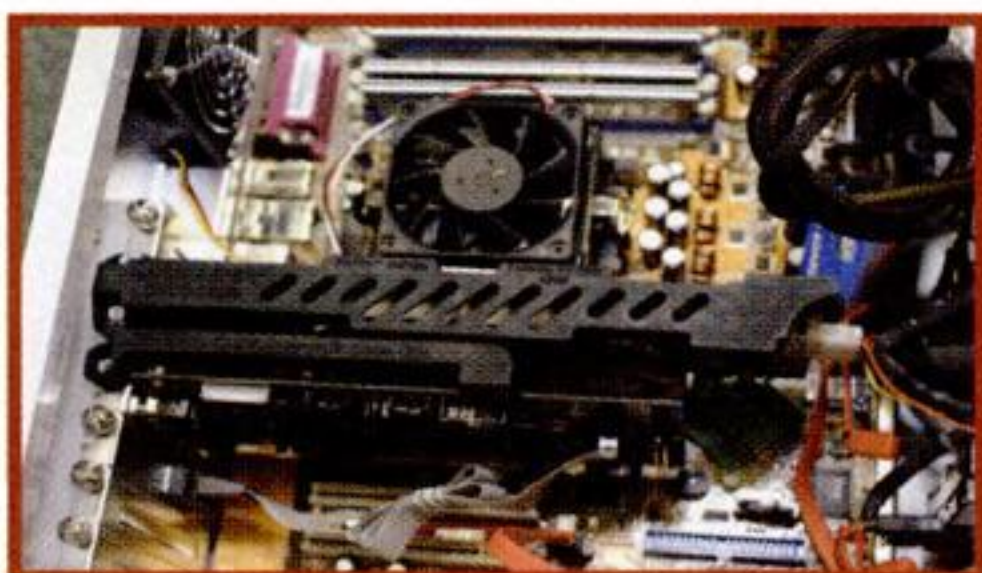
drive head, you're wrong. It's your add-in cards. Subjected to constant jostling during shipment, add-in cards can easily wiggle out of their slots just enough to cause failure. Today's AGP cards are especially prone to coming loose. In more than a few cases, we've even seen AGP cards that have

dislodged completely and rattled about inside a case, destroying both the videocard and the motherboard.

To overcome the problem, OEM's have begun designing Rube Goldberg-esque locking devices. One PC vendor even uses billets of aluminum to keep the AGP cards secure. Obviously, you can't do this yourself, but you can buy the CardKeeper from www.cardkeeper.net.

The CardKeeper's brackets fasten to the rear of a PC and keep cards from popping out from shock or vibrations. They come in a variety of sizes that fit most PCI and AGP cards; a recently released model can even batten down the heavy GeForce FX 5950.

Most of the CardKeepers sell for less than \$4, with the larger GeForce FX 5950 version running \$10. We used the CardKeepers to secure cards on several PCs we had to ship around the country, and we've seen vendors such as Alienware and Voodoo use them as well.



Best of the Best

As of May, 2004

We've finally bumped Sharp's tasty LCD flat panel for Dell's *waaay*-sexy offering. The Dell was the top dog in this month's Maximum PC Challenge, and our lab experts believe it's actually worthy of gaming. Expect a more formal review next month. We've also added a category for Athlon FX motherboards. Although AMD is expected to introduce a Socket 939 mobo to replace both Socket 754 and Socket 940 very soon, Athlon 64 FX fans who want to jump in with both feet may not be able to wait two or three months for it. Also new is a category for 7.1 speakers. We admit it's a Creative-only category right now, but folks with new 7.1 soundcards want a choice.

High-end videocard:

ATI Radeon 9800 XT

Budget videocard:

BFG Asylum GeForce FX 5700 Ultra

Do-everything videocard:

All-in-Wonder Radeon 9800 Pro

Soundcard:

Sound Blaster Audigy 2 ZS Platinum

Serial ATA hard drive:

Western Digital 740GD/ IBM 7K250

Parallel ATA hard drive:

Western Digital WD2500JB

CD-RW drive:

Plextor PlexWriter Premium

DVD burner:

Plextor PX-708A

LCD monitor:

Dell 2001FP

High-end CRT monitor:

Sony F520

Budget CRT monitor:

Cornerstone P1750

P4 motherboard:

Chaintech 9CJS Zenith

Athlon XP motherboard:

Asus A7N8X Deluxe Rev 2

Athlon FX motherboard:

Asus SK8V

Portable MP3 player:

Apple iPod 40GB

Photo printer:

Canon i900

Pocket PC PDA:

HP iPaq 5555

Palm OS PDA:

Palm Tungsten C

7.1 speakers:

Creative Labs 7.1 Gigaworks S750

5.1 speakers:

Logitech Z-680

4.1 speakers:

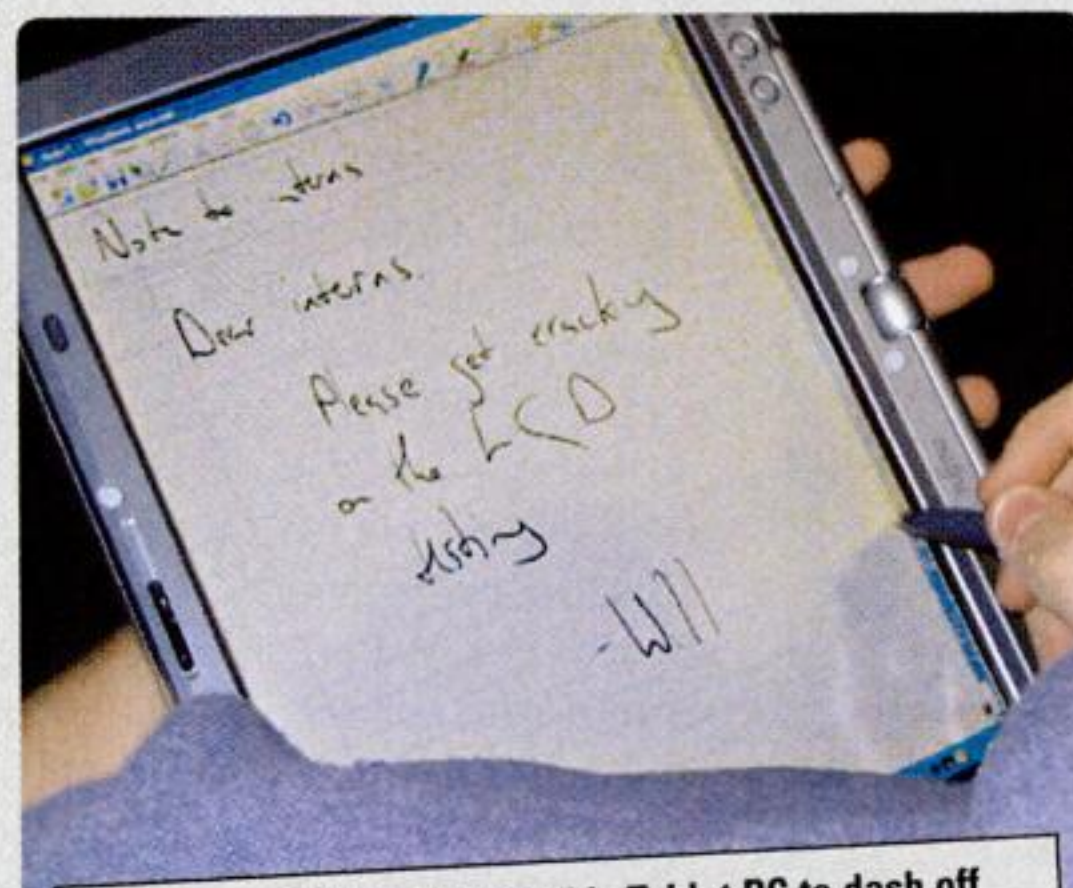
Logitech Z-560

2.1 speakers:

Logitech Z-2200

Our current gaming favorites: *Our current gaming favorites: Battlefield: Vietnam, Far Cry, Unreal Tournament 2004, Planetside*

When Tablet PCs Go Bad



Tech Editor Will Smith uses his Tablet PC to dash off a quick e-mail ordering the *Maximum PC* interns to organize the LCD shootout (pg. 54), STAT!



Hmmm... we know they have eight LCDs to set up, but it shouldn't take *this* long. What the heck are those interns doing in there? And is that *Santana* we hear playing?

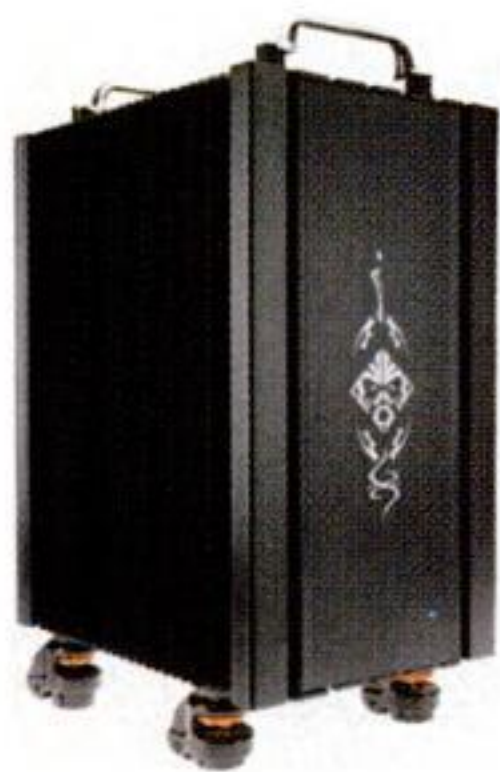


Unbeknownst to us, the Tablet's handwriting-recognition software turned the "C" in LCD into an "S," sending the interns into another dimension. It took six hours, two liters of Snapple, and a copy of Linda Rondstadt's *For Sentimental Reasons* to bring them back down to earth.

Voodoo Rage f50



The case of this ultra-quiet PC is the cooling element, and is very—dare we say it?—cool



The Rage f50 is so heavy it comes with wheels.

Turning on your PC is *not* a silent affair. Hard drives spin up, optical drives click, and even worse, fans whir like tiny helicopters preparing for liftoff. As high-end systems get faster, fan noise gets progressively worse. To counter today's ever-louder systems, Voodoo has created the first PC that we know of to use an entirely passive cooling solution. Instead of moving fans, a water-system, or some sort of exotic refrigeration method, the Rage f50's case is the cooler.

What does this mean exactly? The f50 case—a customized Zalman TN 500A—comprises an elaborate system of heat pipes and cooling blocks that transfer heat from the internal components to the case chassis itself, which essentially functions as an all-encompassing heat-

sink. Each side of the heatsink case is a solid piece of metal that sports a series of cooling fins. As air moves over the case and fins, it reduces the accumulated heat, keeping the PC's innards nice and cool.

By using a purely passive cooling system, the Zalman case minimizes the

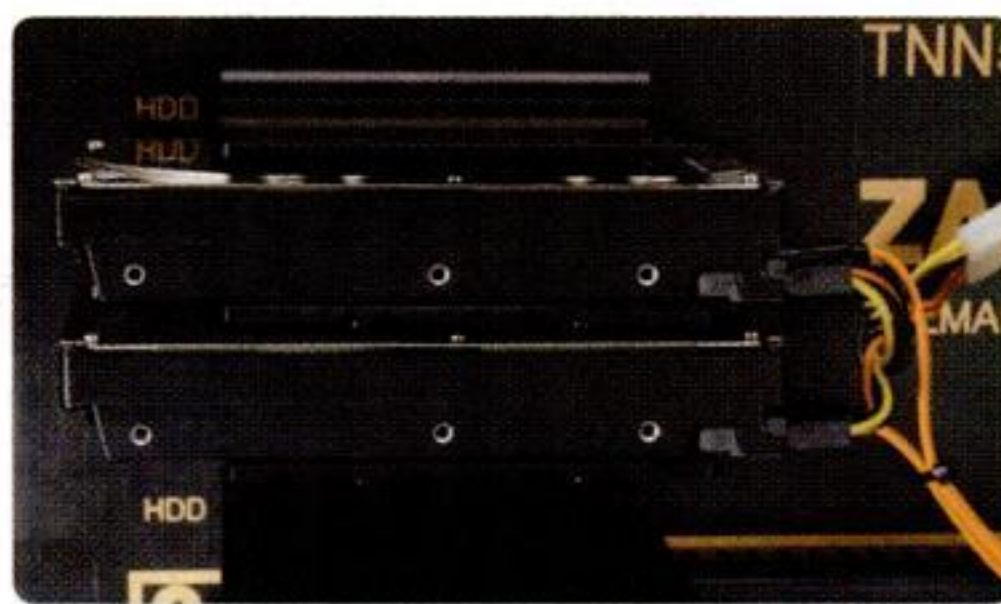
number of moving parts inside the PC, thereby reducing noise. Indeed, the only mechanical parts in the Rage f50—and thus the only source of noise—are the optical drives and hard drives.

In the interest of temperature management, Voodoo eschews the hotter Athlon FX in favor of an Athlon 64 3400+ CPU. But by pairing this slower CPU with a VIA chipset-based Asus K8V-Deluxe mobo, the f50 is nearly as fast as our zero-point machines, which use FX-51 CPUs on nForce3-based chipsets. As it is, the f50 requires five heat pipes to cool the Athlon 64 3400+. A faster dual-channel FX processor would call for even more apparatus.

Heat issues notwithstanding, Voodoo didn't skimp on the video-card. The f50 boasts a powerful Radeon 9800 XT. Even though it's cooled with just two heat pipes, the board's core and memory run at full throttle, as is evidenced by the f50's gaming benchmark scores. It did concern us that the card's memory is without any kind of heatsink, but our torture tests elicited nary a flaw. In fact, we were actually surprised to see that the f50 is faster than our zero-point rigs in the *Jedi Academy* benchmark.

It's unusual to see a premium PC that doesn't include the popular high-performance 10,000rpm Western Digital Raptor hard drives, but Voodoo opted for two relatively cooler, quieter 7,200rpm 120GB Hitachi Deskstars for obvious rea-

Voodoo mounted the hard drives to these metal blocks, which are attached to the case itself. Heat from the drives is transferred to the case door, which is then cooled by air.



UNDER THE HOOD

THE BRAINS

CPU	AMD Athlon 64 3400+
Mobo	Asus K8V-Deluxe (Via K8T800 chipset)
RAM	1GB Registered DDR400 (two 512MB sticks)
I/O ports	Four High-Speed USB, six high-speed USB, one serial, one parallel, three FireWire
LAN	Onboard 3COM 3C940 Gigabit Ethernet

DISPLAY

Videocard	ATI Radeon 9800 XT (412MHz core, 365MHz DDR)
------------------	--

STORAGE

Hard drives	Two 120GB Hitachi 7K250 (7,200rpm SATA, 8MB cache), integrated Promise RAID chip
Optical	Plextor PX-708A dual-format DVD+RW/RW (8x DVD +R, 4x DVD-R, 24x CDR); Plextor Premium CD-RW 52x32x52

AUDIO

Soundcard	Sound Blaster Audigy 2 ZS
------------------	---------------------------

FINE DETAILS

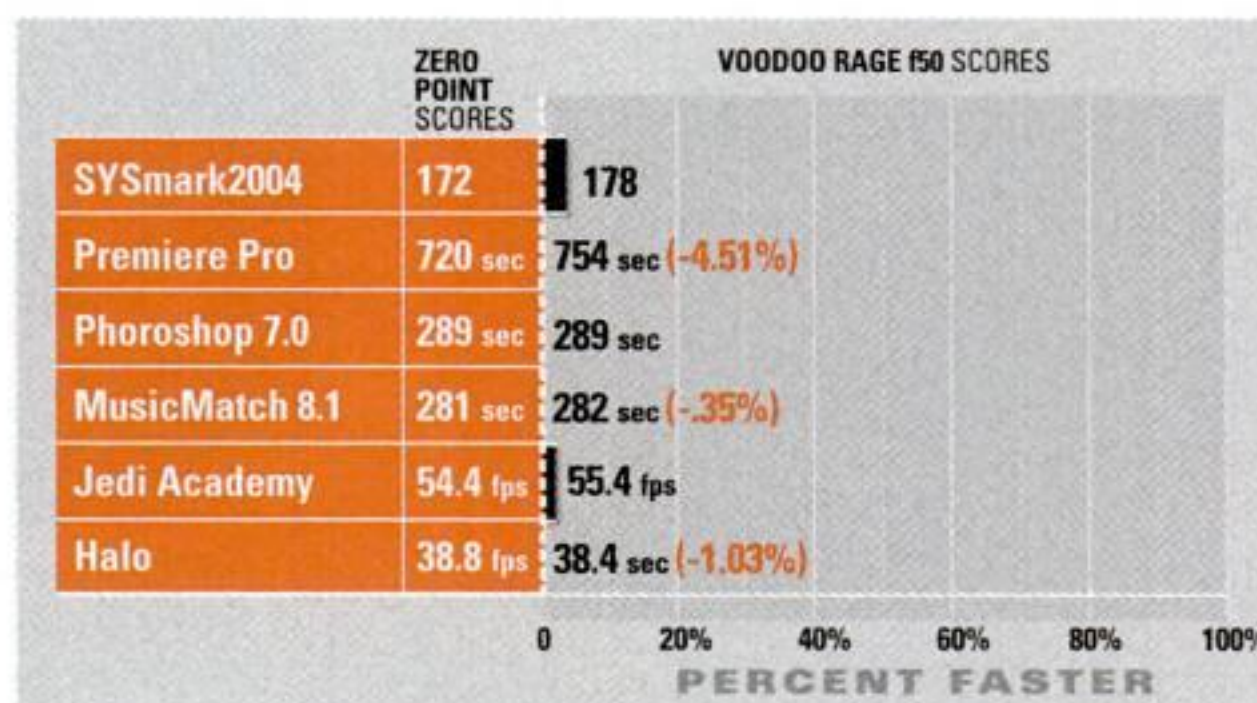
Case	Zalman TN 500A, custom power supply
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BUNDLE

Windows XP Home, Roxio Easy CD & DVD 6, Roxio PhotoSuite 5, Roxio DVDMax Player, Danz Retrospect

BOOT: 46 sec.

DOWN: 17 sec.



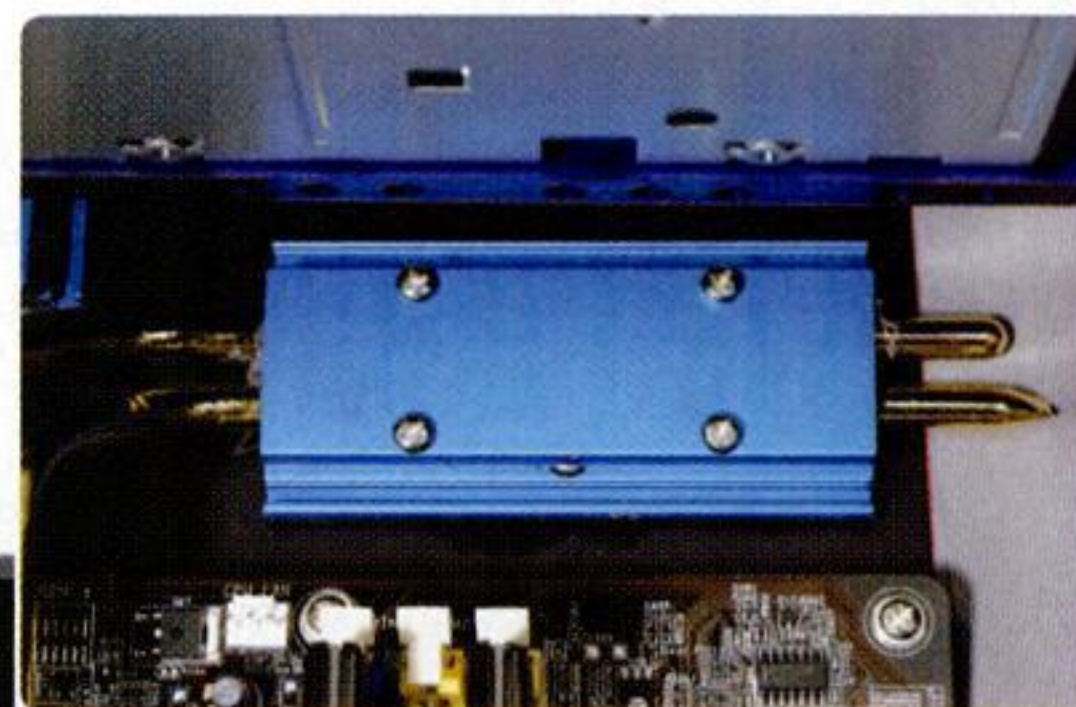
Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

sons. Nevertheless, with its two drives striped in a RAID array, the f50 ekes out top-notch performance. As an added measure, the hard drives are mounted to solid aluminum plates, which serve to transfer heat away from the drives and into the sides of the case.

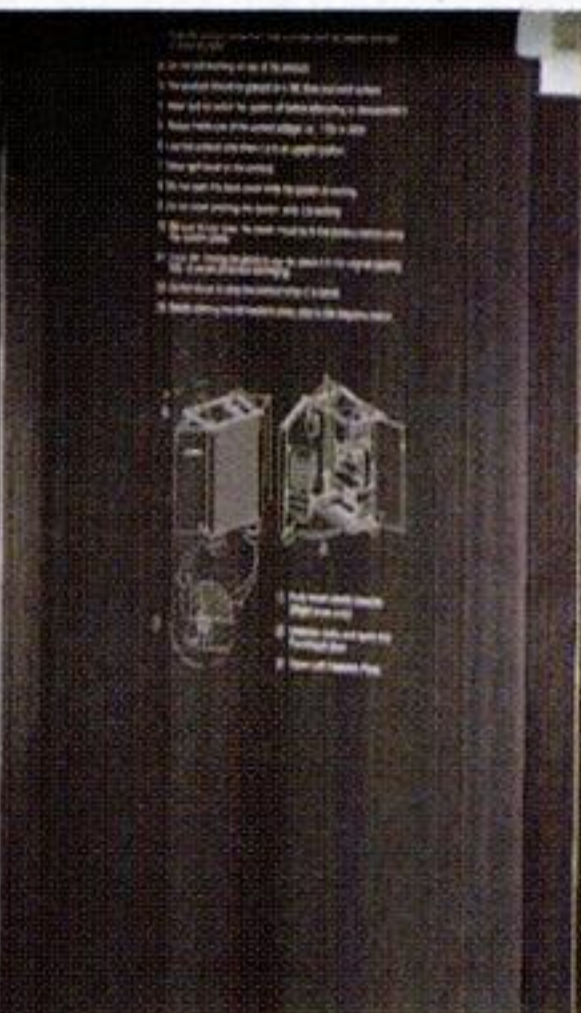
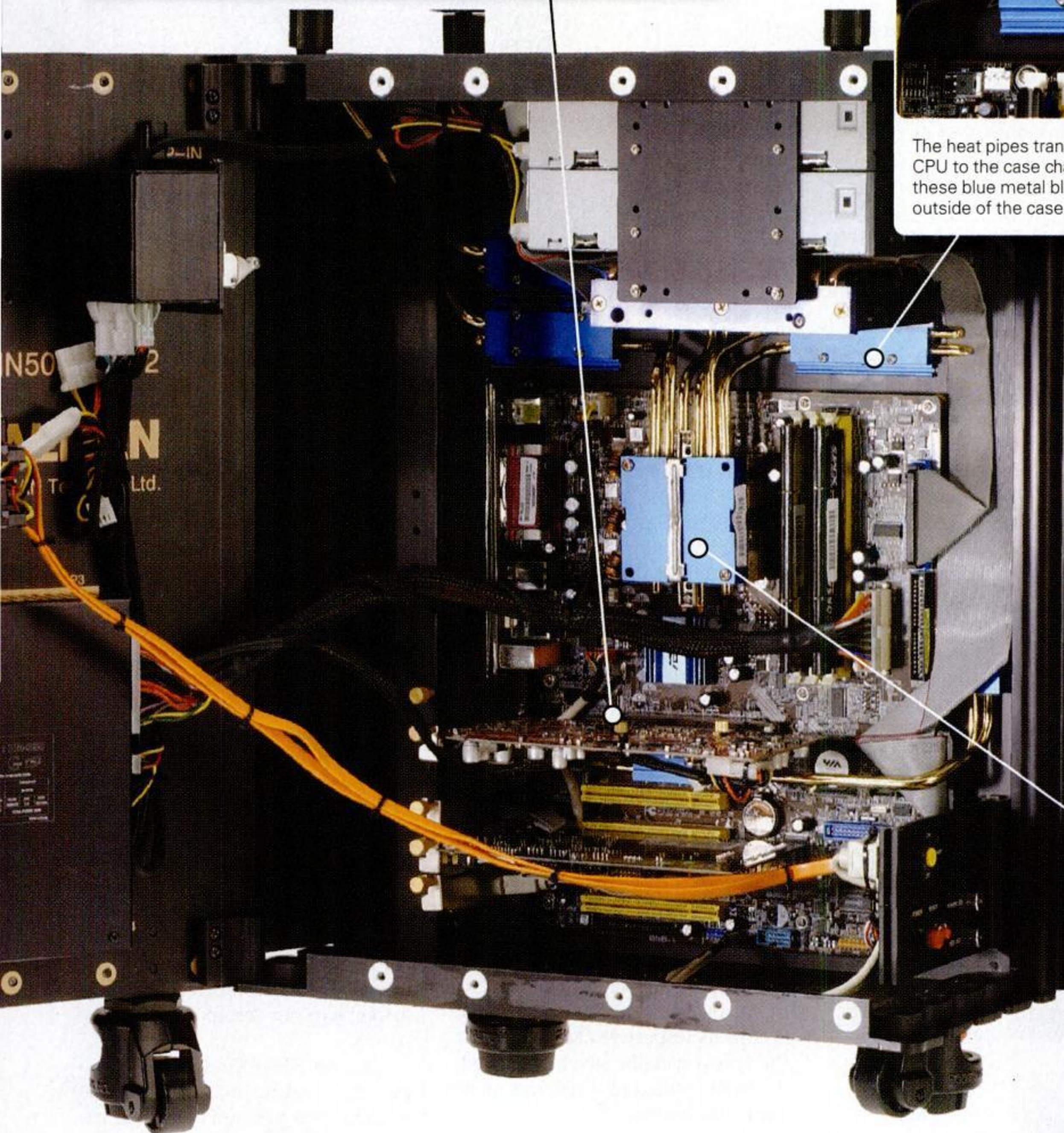
Does all of Voodoo's innovation pay off? Is the f50 quiet? In the *Maximum PC* lab it was virtually impossible to tell when the PC was on or off when we were standing right next to it. Even the drives' noise was masked by the noise of neighboring



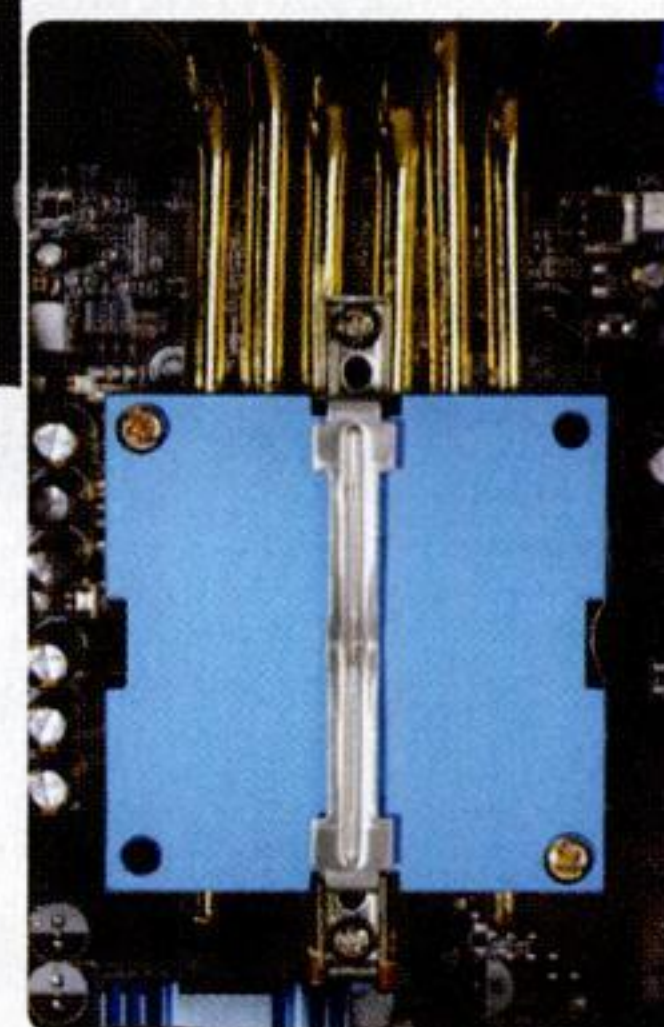
The Radeon 9800 XT in Voodoo's f50 is cooled with just a pair of heat pipes. As with the CPU, these pipes run from the GPU to the case wall.



The heat pipes transfer heat from the videocard and CPU to the case chassis. The heat pipes mount to these blue metal blocks, which are screwed to the outside of the case.



This giant cooling block draws deadly heat away from the CPU, then carries it across five heat pipes to the—you guessed it—case wall, where it will be dissipated via huge cooling fins.



PCs. In a room by itself, the f50's operation is audible, but it's still the quietest PC we've ever tested. The only sounds we detected were the hard drives and optical drives spinning up.

In our opinion, Voodoo could have even suppressed *that* noise. For instance, the use of sound-dampening material around the hard drive mounts would have made a difference. And we'd have used *Nero Drive Speed* or a similar program to ratchet down the speed of the optical drives, which are easily the loudest components in the system.

Cool as it is (forgive the pun), a rig this specialized requires extra attention. Zalman—the case's manufacturer—recommends you keep the PC out of direct sunlight and away from heaters, lest you thwart the efforts of the passive cooling, thereby exposing your components to the risk of overheating. This should also interest people who live in hot climates or lack air conditioning.

Still, the Rage f50 is worthy of attention from hardcore PC geeks, for both its novel and effective cooling methods as well as its tough, radiator-like design.

—WILL SMITH

MAXIMUM PC VERDICT 9

+ PASSIVE COOLING

Performs well and is damn-near silent, even when playing games or running benchmarks.

- PASSIVE AGGRESSION

The system is heavy, difficult to upgrade, and requires extra attention.

\$4,300, www.voodoopc.com

Polywell 900NF3-FX3

A major league system gets dragged down by several minor league problems



Polywell's 900NF3-FX3 certainly seems to have the necessary attributes to claw its way to the top of the high-end computer food-chain: a blazing-fast 2.4GHz Athlon64 FX-53 CPU, a rock-solid nForce3 Pro150-based Asus SK8N mobo, and two 512MB sticks of DDR400 RAM. Adding fuel to the fire is nVidia's latest video-card, the GeForce FX 5950 Ultra, which delivers amazing frame rates and visuals.

Storage comes in the form of two 10K 74GB Western Digital SATA hard drives linked in a RAID 0 configuration; we bestowed a

rare Perfect 10 verdict and Kick Ass award on these speedy drives in our February issue, so we were more than happy to see them again in the FX3 rig. Rounding out this powerhouse of a PC is the demonic CasEdge Diabolic Minotaur case, which comes complete with glowing red eyes and molded plastic horns.

So far, Polywell's

FX3 sounds pretty impressive, right? Wrong. Unfortunately, a closer look at the rest of the machine left us a touch dismayed. Polywell has a history of inconsistency when it comes to choosing its system components. This sorry trend is repeated in the FX3. The first misstep is Polywell's misguided decision to include an Audigy 2 6.1 soundcard when the FX3 ships with a 7.1 channel speaker system. Doh! We would have much preferred Creative's latest offering, the Audigy 2 ZS, which offers full support for 7.1 sound. Also disappointing are the speakers themselves—Creative's budget-conscious Inspire T7700 7.1 set received a disappointing 6 verdict when we reviewed it in December 2003.

The system's optical drive setup—a dual-format Sony DVD burner and an OEM CD-RW drive sporting an integrated 3-in-1 media reader—is similarly questionable. While we appreciate the versatility of the Sony drive and the CD-RW drive's media reader, neither represents the best in its respective category. And the cheap metallic silver paint that Polywell applied to the drives' bezels made us blanch.

Thankfully, these issues don't



The evil-looking Diabolic case perfectly captures the beastly nature of the main components that dwell inside Polywell's 900NF3-FX3.

have a major effect on the FX3's performance, as you can clearly see by the benchmark scores below. The system threw up a whopping 204 in the demanding SYSmark2004 benchmark suit—the highest official score our lab has witnessed since we migrated to the new test in March. The FX3 also made short work of our gaming tests, delivering a dizzying 66.2 frames per second in *Jedi Academy*. That's a near 18 percent gain over our zero-point machine. The FX3 performed similarly well in our *Halo* benchmark, which has a history of bringing high-end systems to their knees, managing 40.7 frames per second. Finally, in our *MusicMatch*, *Photoshop*, and *Premiere Pro* tests, the FX3 pumped out impressive times, albeit marginally lower than our zero-point machine scores.

The 900NF3-FX3 is incredibly powerful, but its inconsistent mix of high- and low-end components is frustrating. Had Polywell paid the same level of attention to the minor details as it did to performance, the FX3 likely would have received a perfect score. As it stands, this PC narrowly misses out on our coveted Kick Ass award.

—TAE KIM

MAXIMUM PC VERDICT

9

+ CHEETAH

Great primary components, blazing performance.

- CHEATAH

Disappointing secondary components, inconsistent quality.

\$3,500, www.polywell.com

UNDER THE HOOD

THE BRAINS

CPU	AMD Athlon 64 FX-53 (2.4GHz)
Mobo	Asus SK8N (Socket-940, nForce3 Pro150 chipset)
RAM	GB DDR400 ECC/registered RAM (two 512MB modules)
I/O ports	Six USB 2.0 (two front, four rear), one parallel, one Serial, two IEEE 1394 (one on mobo, one on Audigy 2)
LAN	10/100Mbit Ethernet (integrated)

DISPLAY

Videocard	nVidia GeForce FX 5950 Ultra (575MHz core, 400MHz DDR)
TV-tuner	WinFast TV-Tuner 2000XP Expert PCI

STORAGE

Hard drives	Two 74GB Western Digital Raptor (10,000rpm SATA), RAID 0
Optical	OEM Sony DVD+/-RW burner (DW-U14A, 4x DVD+R/+RW, 4x DVD-R, 2x DVD-RW, 24x CD-R, 16x CD-RW) BTC OEM CD-RW burner 32x with 3-in-1 media reader
Other	1.44 MB floppy drive

AUDIO

Soundcard	Sound Blaster Audigy 2 6.1
Speakers	Creative Inspire T7700 7.1

FINE DETAILS

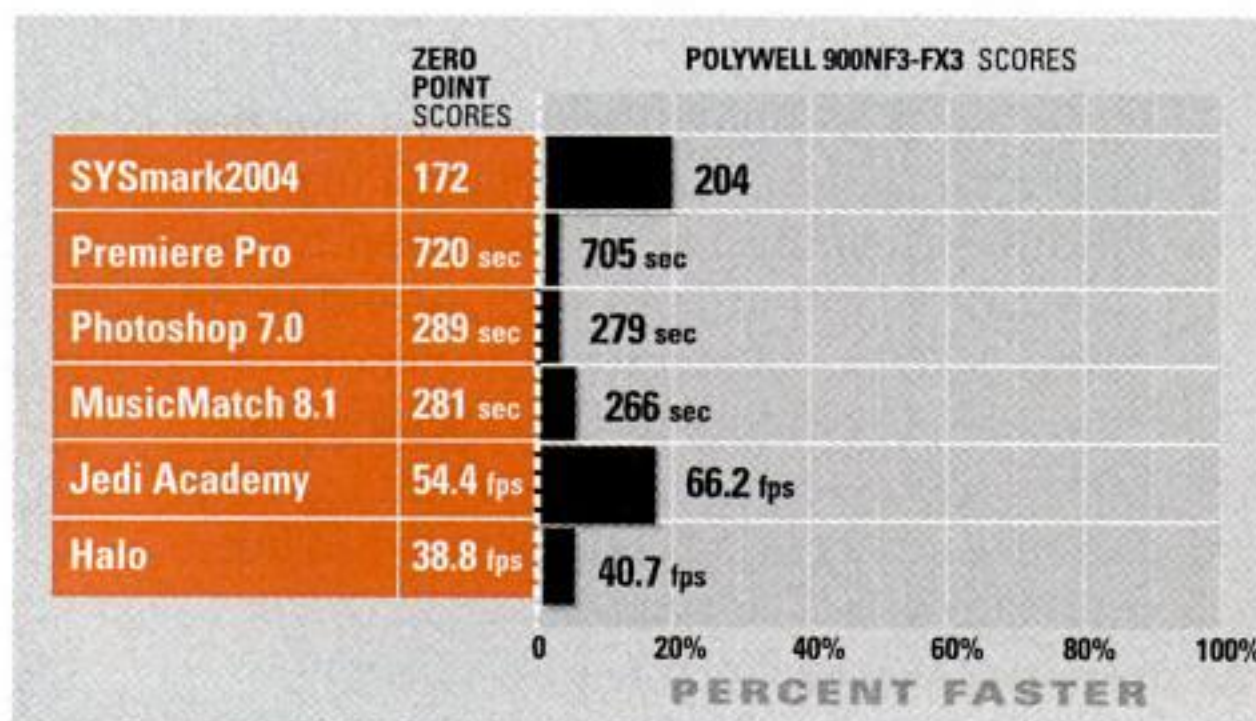
Case	CasEdge Diabolic Minotaur
Power supply	SPI 400 watt OEM PSU
Fans/extras	12cm case fan, AMD CPU fan, blue cold cathode ray light
Keyboard	Microsoft wireless keyboard
Mouse	Microsoft wireless optical

BUNDLE

Windows XP Home, 3D Extreme Action Games Pack

BOOT: 40 sec.

DOWN: 18 sec.



Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

Backup Drive Bedlam

Two enormous backup drives go head to head
(or is it back to back?)

Most people consider data backup a cautious task performed by only old people, like saving used tinfoil or driving a Rascal. But the truth is a lot of cool people back up their data. What do you think Snoop Dogg does with the tracks he's created for an upcoming album? He backs them up, of course. Sure, he calls it a "bizzackup," but the message is clear—you need to protect yourself from data loss because we're all vulnerable to it.

To discover which backup drive *es mas macho*, we pitted two almost identical drives from Maxtor and Western Digital against each other. Both sport a 250GB capacity, 7,200rpm rotational velocity, 8MB of cache, and the exact same software. Both drives are silver with pretty blue LEDs. Is this a case of corporate mind-melding, or two drives that have simply captured the zeitgeist? Maybe a little of both.

—JOSH NOREM

Western Digital 250GB Media Center

Western Digital's new Media Center backup drive is based on the company's superfast Caviar SE hard drive, and offers both FireWire and USB 2.0/1.1 connections. The "media center" aspect comes in the form of a USB hub and an 8-in-1 media reader—a great idea, as it integrates devices we'd otherwise have dangling from our PCs and accommodates convenient USB key usage (something we've long fantasized about). The media reader accepts all popular forms of removable media and even works when the drive is turned off. (The drive can be purchased as a non-Media Center version for \$50 less.)

For backup purposes the drive includes Dantz *Retrospect 6.5*, which is *extremely* easy to use. While it offers numerous advanced

features, its primary role of making backups is simple to master and hard to fault. An "Automatic backup" button on the drive's faceplate opens a wizard that walks you through creating a backup script that you schedule to run automatically. Or you can press the "On Demand" button on the drive's face to perform a spot-backup any time you choose. The drive also has a handy built-in feature that prevents it from being turned off during data transfer.

Overall we're impressed with the Western Digital drive. The addition of the media center and other thoughtful touches show welcome innovation in a market that's largely bereft of fresh ideas.

Maxtor One Touch 250GB

Maxtor's 250GB One Touch drive is similar to the Media Center in that it's based on its maker's *crème de la crème* product—in other words, Maxtor's Diamond Max Plus 9 hard drive. The One Touch is offered in either FireWire, USB 2.0, or a combination of the two. A 300GB model is also available, which is the highest capacity backup drive available for home users.

The drive is wrapped in an attractive aluminum exterior that is light yet rugged. On its face is the "one touch" button that executes Dantz *Retrospect 6.0's* predetermined backup routine (the Western Digital drive has a similar button). You can also schedule automatic backups or set an icon on your desktop that can be double-clicked for a quick backup anytime.

Unlike Western Digital's drive, the One Touch lacks a media center, and if the drive is powered down during data transfer, the process will simply be aborted. These discrepancies make Maxtor's drive an iota less attractive than WD's drive—but it's also \$50 less expensive.



Western Digital's new backup drive adds a ripple to the scene by integrating a media reader and USB port into the drive's plastic shell.

Western Digital 250GB

MAXIMUMPC VERDICT 9

+ HARD DRIVE

Big capacity, fast, easy to use, snazzy media center.

- HEARTACHE

Twice the cost of the desktop version of the same drive.

\$400, (\$350 w/o media center), www.wdc.com



Unlike "the button" in the oval office, this drive's button launches a backup program rather than global thermonuclear war.

Maxtor 250GB FireWire

MAXIMUMPC VERDICT 9

+ DATA

Huge drive, fast performance, easy to use, rugged package.

- BLIND DATA

Missing a few small, handy features found in the WD drive.

\$300, www.maxtor.com

Fujitsu Lifebook T3010 Tablet PC

A Tablet with a keyboard makes us happy, but where's the optical drive?

You've heard about the unbridled promise of Tablet PCs, right? The introduction of a Windows XP Tablet Edition was supposed to usher in a new era of seamless pen- and voice-based computing. Unfortunately, outside of corporate circles, the first wave of Tablets went over with a gigantic *blah*. Not enough pen-based software existed, and frankly, not enough consumers even "got" pen-based computing—at least to the point where they were willing to shell out an extra \$500 for a touchscreen. Fujitsu's T3010, a Tablet that converts into a standard keyboard-based laptop, aims to change this.

But a dearth of third-party pen-based software wasn't the only problem with the first-generation Tablet PCs. The devices were also plagued by anemic, underpowered hardware and wonky handwriting recognition. While the Lifebook T3010 still uses the initial release of the Tablet PC software—we don't expect to see an update from Microsoft until later this year—Fujitsu has thankfully paired the older software with faster components.

The Lifebook's 1.4GHz Pentium 4 M processor is fast enough for just about any of the basic web browsing and desktop apps we use on a daily basis. The diminutive T3010 also sports a 50GB hard drive and 512MB of memory—more than the other Tablets we've seen.

Like the majority of Tablets available today, the Lifebook eschews an integrated optical drive in favor of an optional external drive. Not good. This omission makes installing software difficult for most home users. We're also bummed that the T3010 includes only 802.11b support, courtesy of the Centrino chipset. Support for the faster 802.11g spec is available as an extra, but since the g-spec is

backward-compatible with the b-spec, 802.11g should be standard.

The Lifebook's Intel-powered "Extreme" onboard graphics just plain suck, so don't expect to do any gaming. The onboard speakers are similarly wanting. We've heard 40-cent headphones that are louder than these dogs! Ergonomically, the full-size keyboard is nice, but several important keys have been squished, most notably the right shift and forward slash. We also have reservations about the twitchy touch pad.

As a conventional laptop, the Lifebook doesn't stand out, but we're fans of the basic Tablet functionality. We love being able to jot down quick notes in a meeting and then edit them—either in handwriting form or after running them through the handwriting recognizer—before we e-mail or print them out for others. This convenience is only enhanced by the hyper-accurate screen, which has a textured, slightly rough surface that makes it feel like we're really writing on paper.

Sadly, handwriting recognition remains a major obstacle. The software's ability to convert even perfect penmanship into text is poor, to say nothing of its approach to our abominable scrawl. When you consider that much less powerful Windows Mobile 2003 handhelds boast significantly better handwriting recognition, the Tablet's

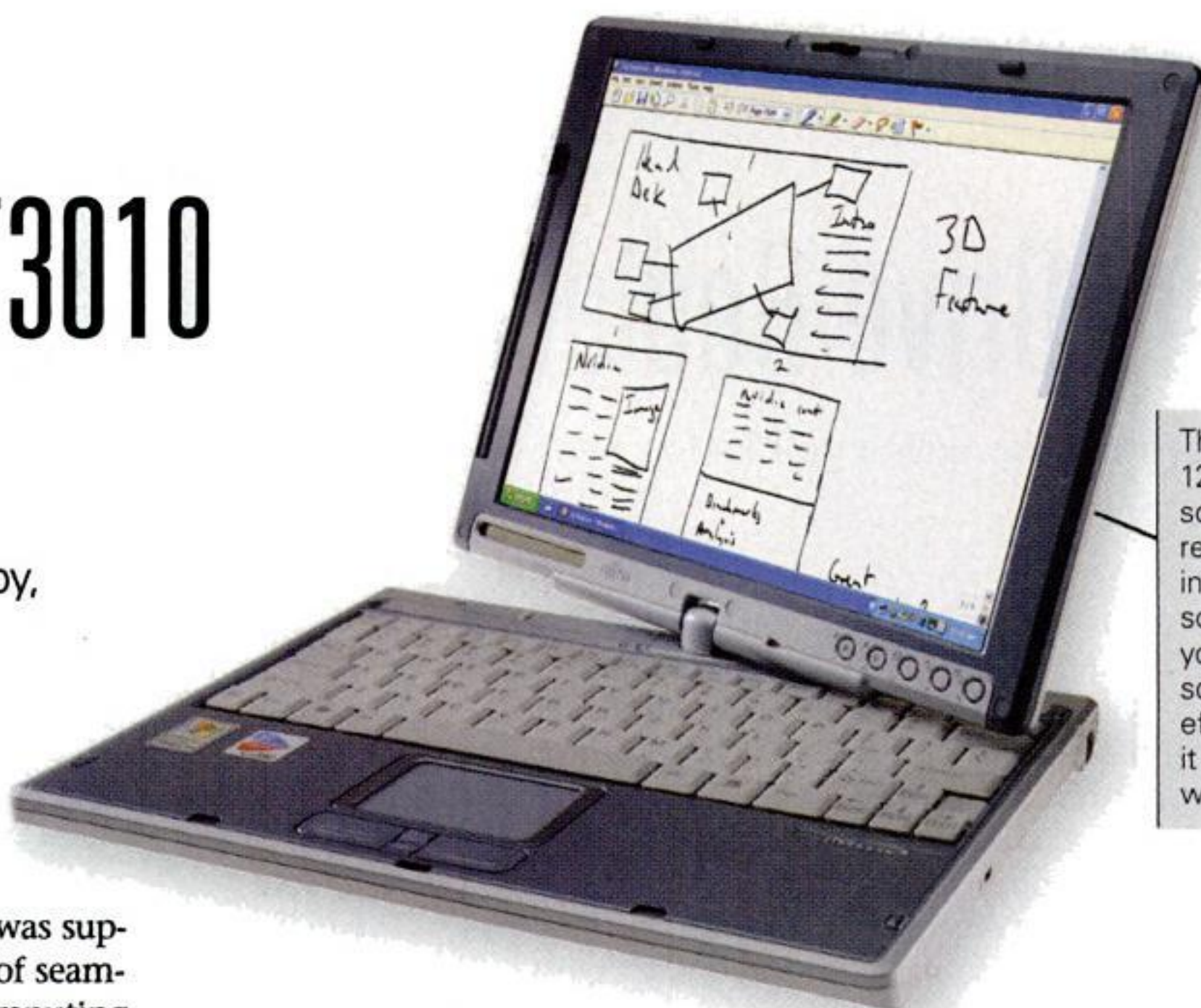
When we story-board *Maximum PC's* feature stories, being able to draw and edit the planned pages digitally makes the process much easier because: 1) We don't have to start from scratch each time we err in drawing; 2) we can quickly print out our story-board when we're finished; and 3) for some reason, there is less temptation to randomly doodle on a Tablet PC than there is on a notepad.

shortcoming is not just surprising, but shameful. Why Microsoft hasn't borrowed from one platform to improve another is beyond us. Hopefully, the next revision of the company's pen-based operating system will be more functional.

We tested the Lifebook's battery life by playing a DVD we copied onto the hard drive, and were pleased to find that the Lifebook was able to loop our rip of *Scarface* for its full three hours and 32 minutes. Battery life was even better when performing less strenuous day-to-day tasks.

Despite its flaws, we still see the Tablet PC as a platform with potential. Once the handwriting kinks get worked out, we expect these convenient devices to end up in homes and on campuses around the country. Until then, we're hesitant to recommend one, though Fujitsu's Lifebook is one of the best Tablet PCs we've tested.

—WILL SMITH



The Lifebook's 12.1-inch XGA screen only reacts to the included stylus, so you can rest your hand on the screen with no ill effects, making it much easier to write well.

MAXIMUM PC VERDICT 7

+ PEN AND INK
Editing "pen and ink" notes kicks ass. Combination of notebook and Tablet features rocks.

- STONE AND CHISEL
Handwriting recognition sucks, and the speakers are under-powered.

\$2,050, www.fujitsu.com

Sony VAIO PCG-TR2A

Small, fast, and comfortable—this is laptop computing the way we like it!

Weighing a mere three pounds with an optical drive, Sony's TR2A is a joy to transport. Granted, Fujitsu paved the way for the innovation when it dramatically transformed the design of its Lifebook P-series, but the TR2A is a respectable knockoff. In fact, the TR2A compares favorably with the Lifebook P5020D, which received a 9 verdict and a Kick Ass award when we reviewed it in the February issue.

Like the P5020D, the TR2A uses a 1GHz Intel Pentium M, also known as Centrino. The Ultra Low Voltage designator on the chip signifies its ability to efficiently provide usable processor power without generating much

heat. Like the P5020D, the TR2A races circles around Transmeta's TM5800 Crusoe chip, which typically powers such small notebooks. Admittedly, the Crusoe is a last-generation part—we have yet to get hands-on experience with Transmeta's upcoming Efficeon.

Performance-wise, the TR2A stacks up nicely against the Fujitsu P5020D. It scores just a hair behind the P5020D in our *SYSmark2002* and *Premiere 6* tests and slightly better than its competitor in *Photoshop*. This isn't much of a surprise considering that both notebooks pack the same amount of RAM, as well as identical CPUs and core logic chipsets. Both mini-laptops were unable to run our *Quake III* demo at 1280x1024 because their displays don't support vertical resolutions higher than 768.

Where the TR2A clearly excels is in audio extraction. The laptop's Matshita optical drive ripped audio 100 seconds faster than the P5020D's Toshiba drive. On the other hand, despite having nearly the same battery capacity (4400mAh vs. 4300mAh in the TR2A), the P5020D ran our test DVD almost 50 minutes longer than Sony's TR2A managed. (It's quite possible the TR2A's XBrute panel consumes more power, or that our test notebook's battery was in less-than-ideal shape.)

Aesthetically, the TR2A has the edge. We like the classy magnesium finish, and Sony's choice of display is similarly impressive. Instead of the typical anti-glare coating most notebooks use, the TR2A features a

reflective glossy-like finish that makes DVDs appear vibrant and appealing. However, under some lighting conditions and during long stretches at the keyboard, we've found that this coating can increase eye strain.

The TR2A's keyboard requires no harnesses, candles, or paddles to use. While it feels slightly spongy, we'll take it over Fujitsu's contortionist keyboard any day. Oddly enough, Sony's signature feature in the VAIO laptop series—the scroll wheel next to the touchpad—is absent.

Sony scores points for including a full-size video-out port so the TR2A can be connected to an external monitor. Using the video port, the TR2A was able to drive an external CRT at 1600x1200 without any problems. Finally, in a nod to the PictureBook VAIOs of yesteryear, the TR2A includes a camera mounted to the frame of the display that can capture still or video images in VGA resolutions.

Would we pick Sony's TR2A over Fujitsu's P5020D? We hate ties, but each notebook has merits that balance the scales of our opinion. The TR2A has a better keyboard, better-looking magnesium case, and a handy VGA port. However, the Fujitsu's extended battery options (you can run two at once), scroll stick, and anti-reflective screen are equally strong.

—GORDON MAH UNG



Stylish and classy, Sony's VAIO mini-notebook also boasts blazing fast speeds.

UNDER THE HOOD

THE BRAINS

CPU	1GHz Pentium M (1MB L2) using Intel 855GM chipset
RAM	512MB DDR266
I/O ports	One CardBus PC Card, head-phone, mic-in, Memory Stick Pro slot, two USB, four-pin FireWire 400 plus DC-out, video out
Modem	V.92
LAN	Intel Pro/100 VE Fast Ethernet, Intel Pro/Wireless LAN 2100 802.11b

DISPLAY

Video	Integrated Intel Graphics
Display	10.5-inch (1280x768@32-bit) using Intel 855GM chipset

STORAGE

Hard drive	Toshiba MK4004GAH
CD-RW/DVD-ROM	Matshita UJDA755

SOUND

Audio chip	Sigmatel AC97
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OTHER

VGA camera built into panel, and a zoom button

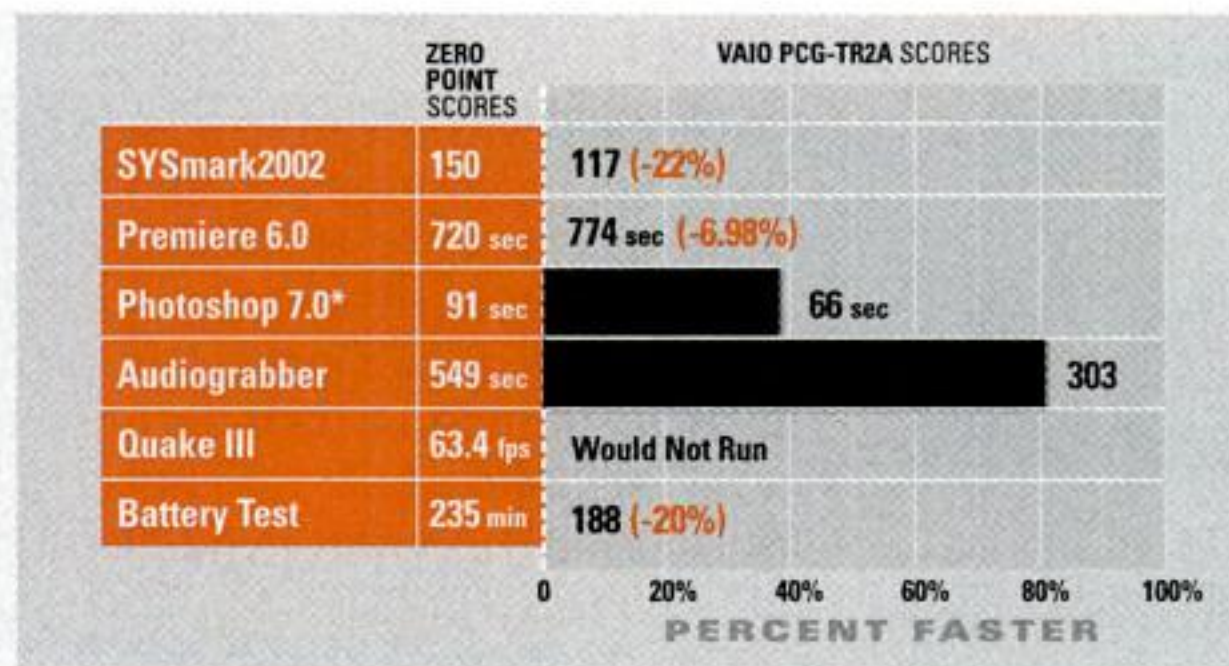
TIPPING THE SCALES

Lap weight: 3.1
Carry weight: 3.3

BUNDLE

Microsoft Windows XP Home, Microsoft Works, Intervideo WinDVD 4.0, Netscape 7.1, Quicken New User, Microsoft Age of Empires II, Money 2004, Works 7.0, SonicStage

BOOT: 49 sec. DOWN: 18 sec.



Our zero-point notebook is a Dell Dimension 8200, and includes a 1.7GHz P-4M CPU, 256MB DDR266, a 64MB 128-bit DDR GeForce4 Go graphics chipset, and a 5400rpm IBM Travelstar 60H hard drive. *Our notebook Photoshop 7.0 test differs from our new desktop Photoshop 7.0 test.

MAXIMUM PC VERDICT

9

+ TATTOO

Good power, fair battery life, and a decent keyboard.

- MINI ME

No scroll wheel?

\$2,100, www.sony.com

Strange Scanner Skirmish!

We investigate two newly discovered species of scanners

Scanners are great—except for their large footprint, high price, difficulty of use, bad software, and frequently poor image quality. These flaws have just about sunk scanners as far as desirable PC objects go, especially with the onset of digital photography.

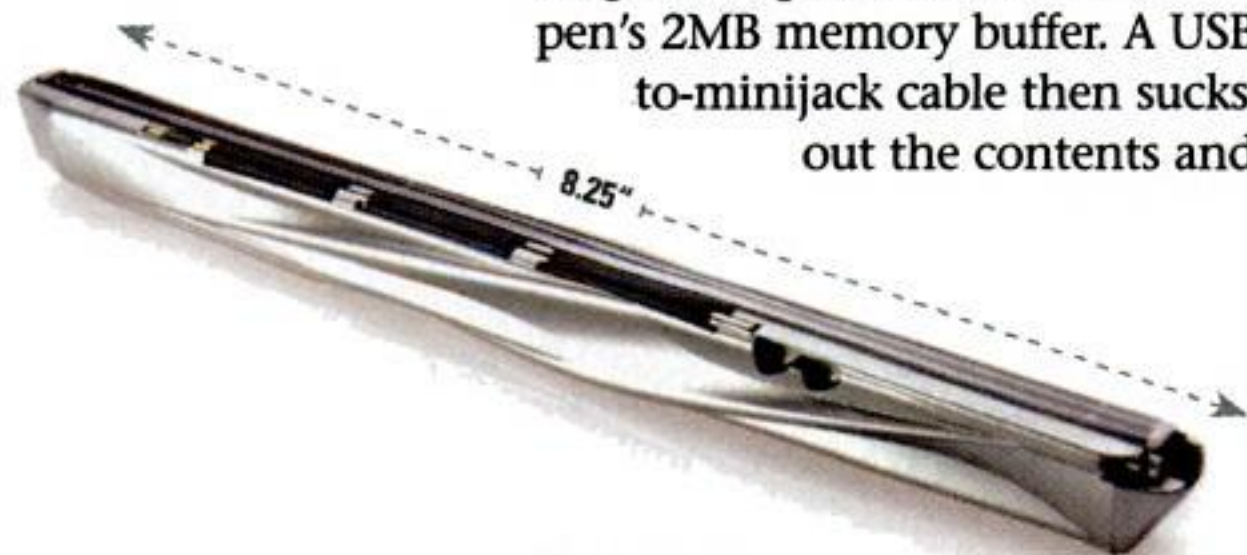
Nonetheless, evolution charges forward. We found two heretofore undiscovered varieties of scanners that are begging to be welcomed back into the food chain. Let's find out if either is fit for survival.

—LOGAN DECKER

The DocuPen is a little long to pass for a real pen, but you get the idea.

DocuPen

By laying the DocuPen horizontally across the top of a page, all the contents can be scanned in a single sweep and stored in the pen's 2MB memory buffer. A USB-to-minijack cable then sucks out the contents and



drags it into the bundled software on your PC for touch-up and printing. At least that's how it's supposed to work. In an ominous warning, the documentation cautions that the DocuPen "may take a little practice."

No kidding. Acceptable scans require an *extremely* steady hand that can move in a perfectly straight line at a perfectly uniform speed. Even the slightest variation creates warping in the scanned image. At the default resolution of

200x100dpi, you can scan a page in four seconds (eight seconds at the maximum 200x200dpi). Our DocuPen could store only about six pages of dense black and white text at high-resolution before the memory was full, which is far below the manufacturer's claim of 12 pages per 2MB. Complicating matters, if you have to abort a scan because you sneeze, you can't even erase your last job.

The software bundle doesn't include any optical character recognition (OCR) software, which is just as well because OCR wouldn't stand a chance against most of our jittery scans. Nonetheless, we were surprised by how well some of our scans turned out. The big problem is that we couldn't rely on a consistently high quality level, so we're not sure who would find this scanner useful.

Scanjet 4670

The concept of the personal scanner receives a vigorous rethinking from HP with the Scanjet 4670, and it pays off big time. When the futuristic-looking scanner's transparent halves are agape, it looks like a hanging file folder. It works like one too; instead of delicately positioning your document onto a glass surface, you simply drop it into the middle of the V. Furthermore, you can pop the scanner out of its stand and place it directly onto a book, painting, or sleeping pet. Preview scans take just five or six seconds, and we completed a 300dpi scan in just 15 seconds. Conversely, scanning an 8.5x11-inch document at the full 2400x2400 resolution took a more laborious two hours and 10 minutes!

Clearly, HP understands that most consumers have simple expectations of their scanners: We want to send pictures to friends, post scans on



Who knew that the Venus flytrap would be the model for next-generation scanners?

the web, or "photocopy" scanned items using our printers. With this in mind, the Scanjet 4670 has one-click buttons that perform each of these tasks. And while the bundled software is agonizingly slow to respond, it presents a streamlined and effective interface that can perform many more tasks. When you're done, the Scanjet 4670 folds up to a width of less than three inches at the base.

Image quality is excellent in ordinary use; e-mail, photo

Scanjet 4670

MAXIMUM PC VERDICT

9

+ GOOD SCANNERS

It's not often a distinctive design also happens to be a user-friendly one.

- ANN LANDERS

"Ghost" colors sometimes appear in high-res scans, and the transparency adapter is abysmal.

\$200, www.hp.com

printing, and color copying all look great. But professionals will be disappointed by a slight color smear in fine detail at high resolutions, and the descreen filter—which has only an on/off setting—isn't effective in removing halftone patterns from magazine scans. Additionally, no amount of fussing and fiddling allowed us to obtain quality results from the included transparency adapter.

The 4670 won't make professional photographers or forgers. But so what? It does its job fast and competently, conveniently stores images, and still permits advanced users to tweak its settings.

DocuPen

MAXIMUM PC VERDICT

4

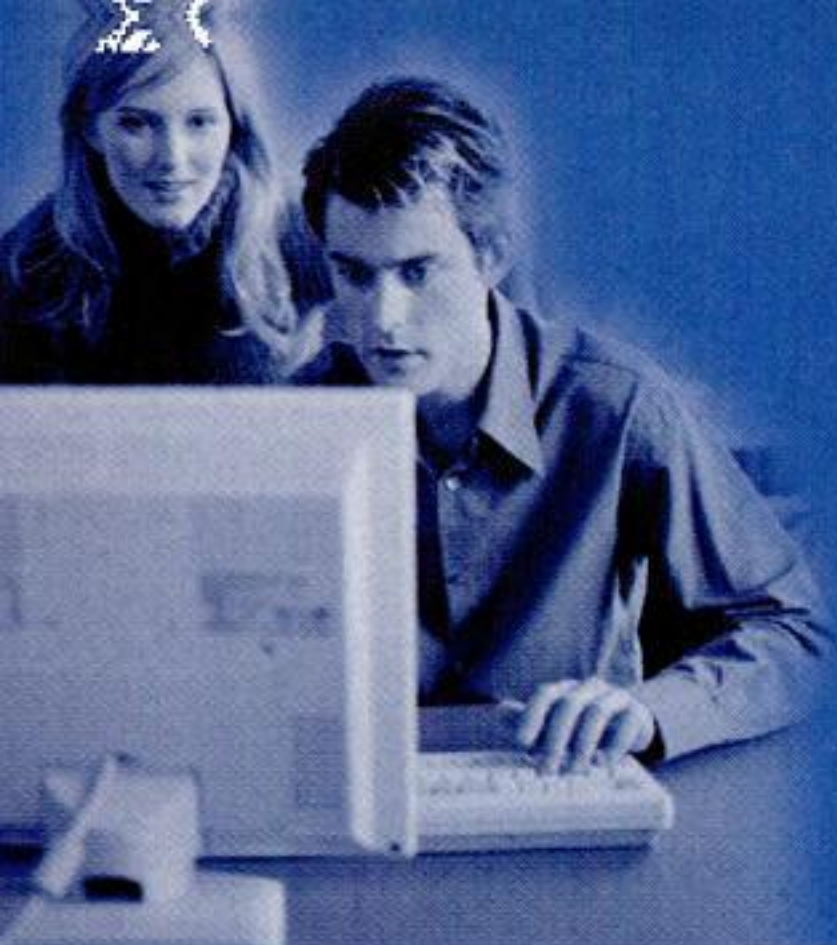
+ GOOD MANNERS

The DocuPen is small and ingenious—low-rent spies will love it.

- BAD SCANNERS

It takes a hell of a steady hand to create a good scan, and the internal memory is measly.

\$200, www.docupen.com



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The Intel® Pentium® 4 Processor with HT Technology is designed for speed.

The ZT PRO System based on the Intel® Pentium® 4 Processor with HT Technology can quickly run multiple applications at one time. So now you can get to the fun fast.



ZT recommends Microsoft® Windows® XP

ZT PRO GAMING X6289

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Intel® Pentium® 4 Processor with HT Technology 3 GHz.....**\$939**



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 Microsoft® Windows® XP Home Edition
 Intel® D865PERLX (865PE Chipset) 800FSB Mainboard
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 Seagate® 160GB Serial ATA/150 Hard Drive
 7 in 1 Universal Media Reader & 1.44MB Floppy Combo Drive
 Plextor 8X DVD±RW & CD-RW Universal Combo Drive
 128MB ATI RADEON™ 9600 XT w/TV Out & DVI
 Integrated 6 Channels Audio & Intel 10/100 LAN
 U.S. Robotics 56K V.92 Fax Modem
 Antec 635 MID Tower Chassis w/350W Power Supply
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 NEC 17" 1280x1024 Flat Panel LCD (Add: \$429.00)

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MaxxBass MiniWoofers

Auxiliary sub doesn't deliver on a brilliant idea

One of the most basic truisms in this universe goes something like this: You can always use more bass in your speaker system. Even if you have a knock-your-socks-off setup with a subwoofer the size of a Volkswagen Bug, you can still use more bass. To this end, MaxxBass has released an add-on subwoofer designed to complement any listening environment that's deemed bass deficient or deserving of extra bass.

This little woofer uses a psychoacoustic phenomenon known as the "Missing Fundamental" to trick your ears into hearing bass tones lower than those that are actually present. This means that MaxxBass' MiniWoofers produce tones at 100Hz, but your mind makes your ears think the tones are 50Hz. It's an interesting concept, but this sub is not wholly convincing in its execution.

We'll admit that we were pleasantly surprised by the little subwoofer's output. For a box that weighs just six pounds and measures 7x7-inches square, the wee woofer is able to pump out some decent thump, but nothing we'd consider substantial. At lower volumes the bass is subtle and feels deep, but when cranked up, the bass effects drop off or distort. While it's a lot more bass than no bass at all, the MiniWoofers pale in comparison to almost any other subwoofer we've listened to over the years. It also lacks mini jack connectors, opting instead for a pair of RCA audio jacks as well as a "subwoofer-in" RCA jack. We connected our test unit to a set of Altec Lansing desktop speakers using an RCA-to-mini jack adaptor.

As an auxiliary subwoofer, this is ideal for systems that have no subwoofer at all, so it's a sort of orphan in the dot-one PC-speaker market.



This little MiniWoofers uses psychoacoustics to trick your ears into thinking they're hearing deep bass.

And it's rather pricey at \$130. That's almost the price of Logitech's entire earth-shaking Z-2200 speaker set. Such dubious merits combined with such a high price? We find ourselves shaking our heads in confusion.

—JOSH NOREM

MAXIMUMPC VERDICT

6

+ CAT SHIRT

Decent output considering how small it is.

- MONKEY SHIRT

Overall anemic bass, limited connection options, high price.

\$180, www.maxxbass.com

Line 6's Guitar Port 2

Plug your guitar into your PC to unleash the monsters of rock!

Knock knock. Who's there? Woo. Woo who? *Woo hoo* is right, baby—Line 6's Guitar Port 2 rocks! If you've got a PC, a guitar, and insufficient room to store a collection of vintage amplifiers, this hardware/software amp modeler is a must-have.

Good amplifiers are not only expensive and difficult to transport, but the classic models are also hard to find because they're no longer produced. Enter amplifier modeling, the mysterious craft of resurrecting the sound of a particular amplifier or speaker cabinet by measuring its acoustic properties and recreating the unique output through software. This is what Line 6 has done with the sounds of 10 classic amplifiers and 14 speaker cabinets (also included are five of the company's own homebrew amp sounds, and seven tweakable stomp box effects). After a quick wizard installs the drivers and connects the Guitar Port to your PC, you just plug your guitar directly into the Port's standard 1/8-inch jack. The signal is boosted and made to sound as if it were coming from, for example, a 2001 3 Channel Mesa Boogie Dual Rectifier Solo Head (for that "big hair" sound).

We're always skeptical when we're pitched a subscription service with our hardware, but the Guitar Port Online package pushed by Line 6 offers a huge payoff for those learning the guitar or simply trying to adopt new styles. You can download tracks from the song database (some of which have been digitized from the original masters), delete the guitar track to play along, and slow down the track to scrutinize licks and even loop segments. You can even download tone settings from the database to emulate the sounds associated with specific artists; a search for Pantera's Dimebag Darrell revealed automatic settings to reproduce the rocker's signature sound.



Jacking into the Guitar Port is sort of like sending your music to *Queer Eye for the Straight Guy*. It goes in kind of bland and oblivious, and comes out sounding fresh and groovy.

Note that only the software is different from the original Guitar Port (downloadable for free for original Guitar Port owners). Although the \$230 price seems steep, the street price is closer to \$170. We've only touched upon some of the features offered by this guitar interface, but suffice it to say, we think the Guitar Port 2 is well worth the money.

—LOGAN DECKER

MAXIMUMPC VERDICT

9

+ JAMES BROWN

Amp modeling, automatic hum reduction, and PC/guitar interface? Sold.

- BROWN NOISE

It's not easy to find help on using Guitar Port with recording software.

\$230 (\$8/mo. for online service), www.guitarport.com

No Guts, No Glory.

Turbo-Cool® 510 Power Supply



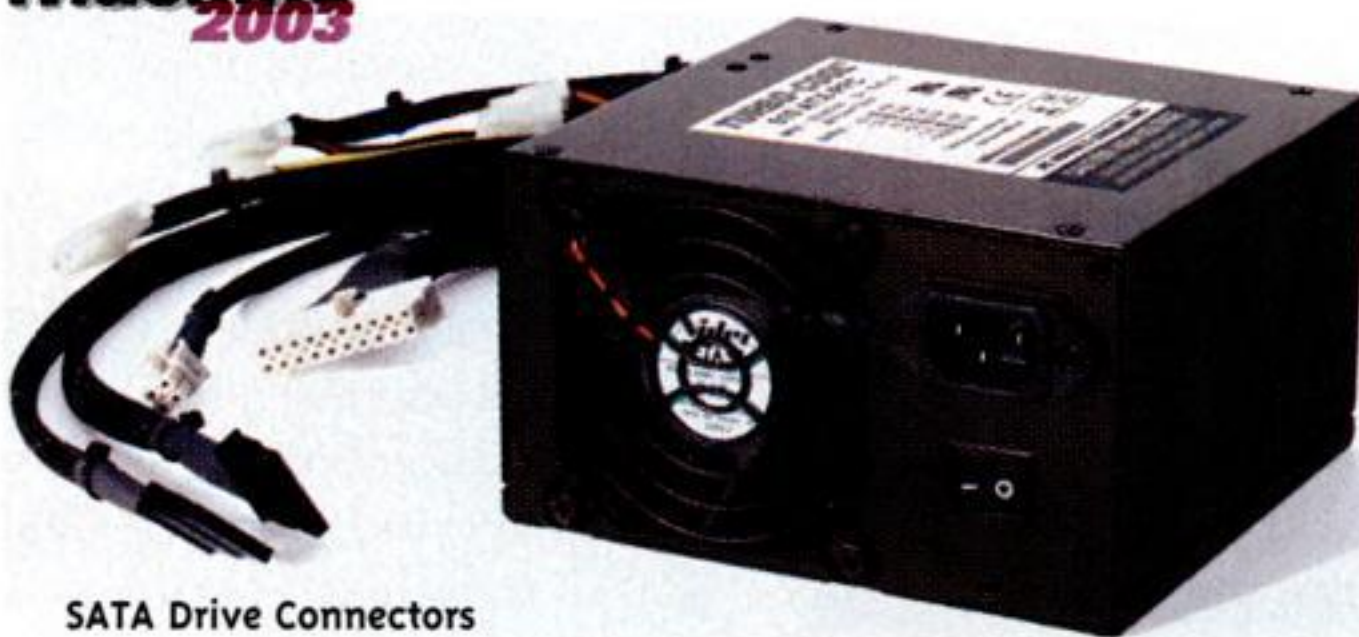
So-Called "550" Power Supply



Power @ 25°C:	600W	550W	Rating requires room temp. < 60°F
Power @ 40°C:	510W	366W	True rating (40°C is typical P.S. temp)
Power @ 50°C:	460W	244W	50°C is the spec for an industrial PC
+12V Output:	34A*	24A	*38A peak. Powers CPUs and drives
Regulation:	1%	5%	Turbo-Cool's voltages are 5X tighter
Ripple:	10mv	50mv	Turbo-Cool's outputs are 5X cleaner
Max. Cooling:	44 cfm	40 cfm	Tests show "550's" 2nd fan is ineffective
Active PFC:	Yes	No	Continuous range line conditioning
Voltage Pots:	Yes	No	Adjustments for system fine tuning
Intel Listed:	Yes	No	Turbo-Cool 510 tops Intel's ATX12V list
Warranty:	5-Years	1-Year	Reliability and longevity indicator

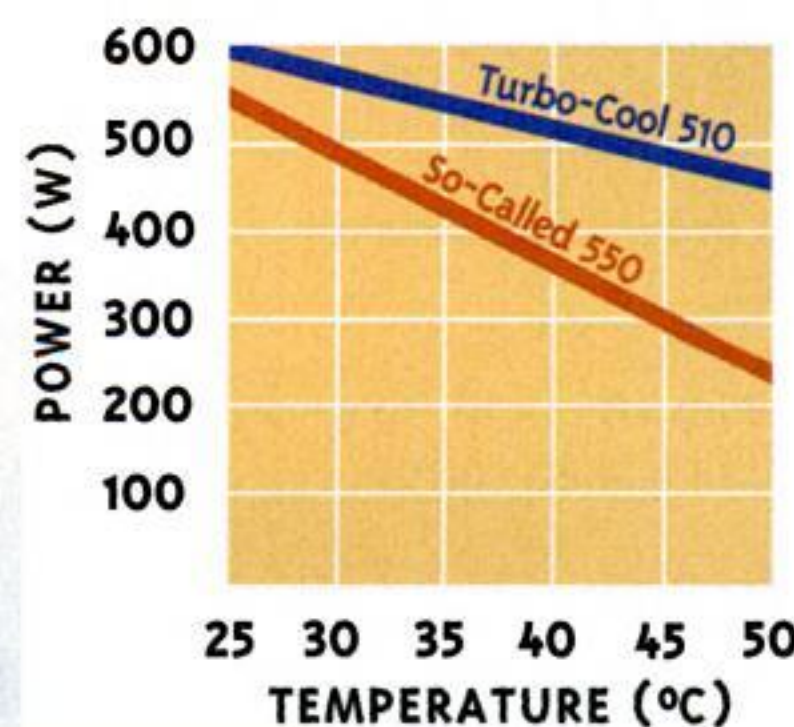
MAXIMUM PC
Dream
Machine
2003

**Turbo-Cool® 510 gives you
Bragging Rights!**



SATA Drive Connectors

Don't be Mislead by Wattage Claims!



Even though the ambient temp. in a power supply is at least 40°C (104°F), most manufacturers unrealistically assume 25°C (77°F) in order to exaggerate their wattage claims. Since the proper full-load rating is 15°C higher, these power supplies produce **33% less power than their advertised ratings** as shown on the derating chart.

*Turbo-Cool 510 derating spec: full load @ 40°C, decrease to 90% load @ 50°C.
So-Called 550 manufacturer's spec: full load @ 25°C, decrease to no load @ 70°C.*

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Solid-State MP3 Melee

Creative Labs and TDK up the ante with two new solid-state MP3 players



Despite the fact that solid-state MP3 players are smaller, lighter, and more durable, their capacious hard drive-based counterparts garner all the attention.

Might these two players from Creative Labs and TDK be the last hurrah for the solid-state category? One player suggests the end is nigh, but the other reminds us that there's still plenty to lust over.

—LOGAN DECKER

Mojo 256F

We expected TDK's Mojo 256F to be as tasty as the company's CD-based MP3 players once were; instead we got the digital equivalent of bad sushi.

The 256MB Mojo (expandable with SD cards) connects with a proprietary USB cable, which is awkward and ridiculous, considering that the custom plug is no smaller than a standard mini USB cable. And the player doesn't show up as a removable drive in Windows Explorer, so you

several different albums in different folders, so we had to drag tracks individually to upload them. Even worse, with each upload, we were asked "Are you sure?" as if we were about to launch a nuclear missile. Luckily, the Mojo does come with plug-ins that allow you to use it with other apps like *Windows Media Player*.

The Mojo 256F's output is meek even at its highest volume level. On the bright side, however, we had no qualms with the sound quality; there were no annoying clicks when switching tracks, and no distortion at the highest volume. We were also pleased with the Mojo's five-band custom EQ and support for variable bit rate MP3s.

The Mojo includes some extras, namely voice recording and an FM tuner. Nonetheless, this isn't the solid-state player that will save the category.

MuVo TX

Creative Labs' marvelous two-piece MuVo MP3 player excellently showcases all the advantages solid-state players have over their hard drive-based brethren.

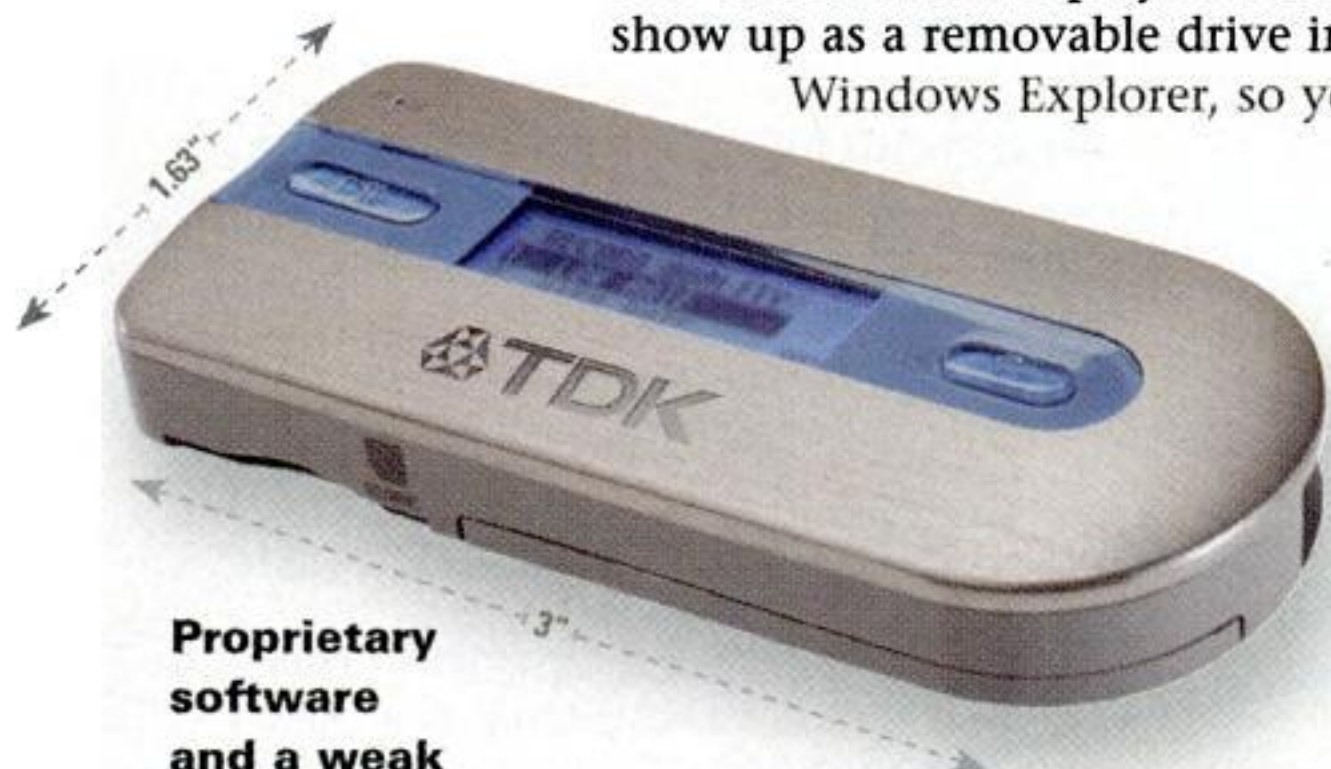
Try to find a hard drive-based player that takes less than three seconds to power up and begin playing your MP3s. Or one that's only 2.75-inches long and .25-inches thick (which is slightly smaller than a middle finger being raised at Apple's mini iPod). And how about 12 hours of play time at maximum volume? The MuVo TX boasts it all.

There's plenty more to love, like the whopping 512MB of internal memory. It's not expandable, but

Creative Labs' sassy two-piece keeps getting better; now it's got 512MB of built-in storage.

if you need more than 512MB, a hard drive player would probably serve you better anyway. The MuVo TX also doesn't require any software or drivers, although Creative's *MediaSource* is included in case you need an MP3 ripper and software player. And, like the previous-generation MuVo NX, the controls have been whittled down to a well-thought-out minimum, with prominent controls and a multifunction scroll wheel.

The MuVo TX throws in a voice recorder, variable bit rate MP3 support, and—thank heavens—true high-speed USB 2.0 support. It also allows you to transfer and play back the contents of folders, although it will only recognize one level deep, meaning that nested folders will be ignored.



Proprietary software and a weak maximum volume keep the Mojo 256F from being all it could be.

can't drag and drop your MP3s or data files. Pooh.

The player's bundled software is a heartless experiment in evil. You can't queue multiple tracks across

WHAT ABOUT THE HEADPHONES?

When choosing your portable audio device, always factor in the price of a decent set of earbuds or headphones. We rarely mention the quality of bundled earbuds in our MP3 player reviews because, plainly, they always suck. All of them. Even the iPod's, while relatively good, still suck. So don't skimp—the differences in MP3 player audio quality can be slight, but the difference between good and poor earbud quality is huge.

We use Shure's E3c sound-isolating earbuds (\$180, www.shure.com) to test all MP3 players for sound quality. Almost as good is the company's E2c set (\$100). At the low end is Sony's Fontopia product. At \$40 it's a lot of bass for your buck.

Mojo 256F

MAXIMUM PC VERDICT

5

COMPRESSION

Thin and light, with buttons conveniently arranged on one side of the player.

DEPRESSION

Must be used with a proprietary cable, doesn't show up in Explorer, and more.

\$210, www.tdk.com

MuVo TX

MAXIMUM PC VERDICT

9

EARS

Oodles of flash storage, USB 2.0 support; a new high for solid-state MP3 players.

EARWIGS

Memory isn't expandable. The usual crappy earbuds.

\$270, www.muvo.com

TDK 8x Indi DVD Burner

Is TDK still A-OK at DVD-R?

TDK's handsome, subtly two-toned Indi DVD burner boasts all the latest drive speeds, and though it's not a medalist in any of the performance categories, it's still a fine drive and a great value for less tangible reasons. But more on that later.

Burning our 4.25GB test disc to DVD+R took 9:42 (min:sec), nowhere near the 8:11 aced by Plextor's 8x PlexWriter. DVD-R recording lagged a few seconds behind at 10:00 exactly. Burning rewriteable DVDs resulted in more so-so numbers—14:44 to 4x DVD+RW and 27:31 to 2x DVD-RW. The Indi's access times reached the top of the pack, however (see the chart below). Nicely, this DVD burner can write at 8x speed to specific brands of 4x media, which is an important feature that can save you a lot of time and money in the long run.

The drive's bundled software package comes from Roxio, a company in the habit of producing stable, easy-to-use applications. Our only complaints with the bundle (which includes a DVD authoring app and Roxio's own software DVD player, *DVDMAX*) are that it lacks a sophisticated video-editing application, and *Creator Classic* constantly nags you to upgrade from the basic edition. How unseemly!

Just like every other optical drive we've ever received from TDK, the 8x Indi DVD's documentation is the best in the business. An illustrated quick start poster walks you through installation in a step-by-step process that even the biggest clod in the world could understand. The software "quick guide" explains what each software module should be used for and explains most of the processes you'll encounter as you use the drive—from ID3 tag editing to adding transitions to video clips—in plain English. The technical support number is printed on the front of the



Writes to:	
DVD+R	8x
DVD-R	4x
CD-R	32x

Rewrites to:	
DVD+RW	4x
DVD-RW	2x
CD-RW	24x

Reads:	
DVD-ROM	12x
CD-ROM	40x

TDK's 8x Indi DVD burner is back in black. If only it burned a little faster...

manual, not buried in the back pages. We don't usually gush over manuals, but TDK stands out by making an effort to ensure that users actually enjoy using its DVD burners.

And, hey, if we here at *Maximum PC* stand for anything, it's hardware enjoyment. Well, that and sweat-inducing, spicy-hot pickles.

—LOGAN DECKER

THE BUNDLE

Roxio DVD Builder (disc authoring)
Roxio Creator Classic 6
Roxio Photosuite Standard Edition
Roxio Retrieve (disc cataloging)
Roxio DVD Max (DVD playback)

BENCHMARKS	DVD	CD
Average data transfer (MB/sec.)	9.3	4.7
Random/full-stroke seek (ms)	116/208	117/180
Audio extraction (min:sec)	N/A	4:35
Data DVD/CD burn (min:sec)	9:42 (DVD+R)	3:44
CPU utilization (%)	10 (2x)	5 (8x)

The data CD burn test uses the bundled applications to create a 700MB CD-R. The data DVD burn test uses the bundled applications to create a 4.25GB data DVD. The audio-extraction test uses a commercially stamped 74 minute audio CD. All tests were performed using Verbatim media, except where noted.

MAXIMUM PC VERDICT 7

+ BURNING IN SECONDS

Writes at 8x to certain brands of 4x media, great documentation.

- SECOND-DEGREE BURNS

Performance is below average.

\$280, www.tdk.com

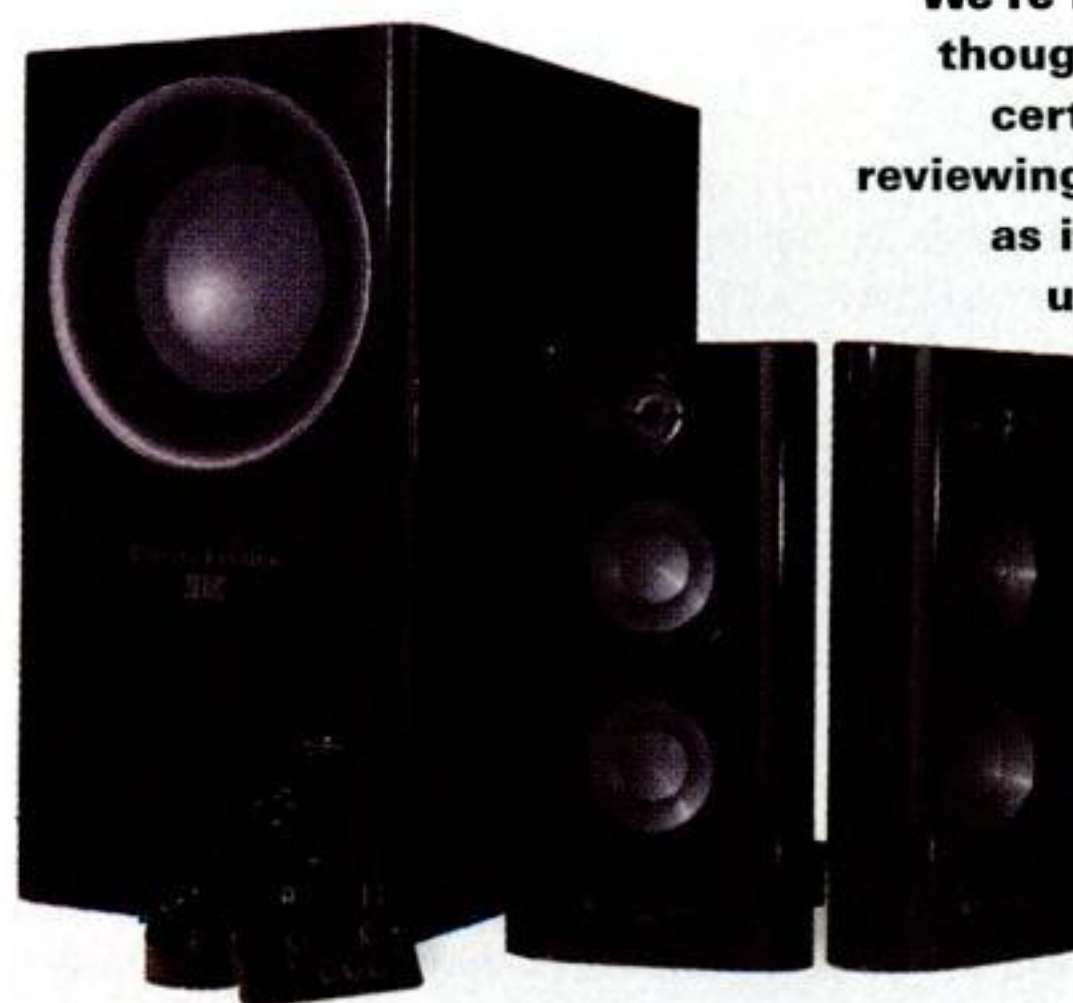
Altec Lansing MX5021 Speakers

This 2.1 set is pleasing to the eye, but less so to the ears

Altec Lansing's MX5021 speaker system is a textbook case of form over function. It looks splendid but is sharply flawed. Let's start with the satellites. Rather than using a pod-shaped, single-driver satellite, Altec opts for thin, oval-shaped towers sporting dual 3-inch midrange drivers and a single 1-inch horn tweeter apiece. With a sexy satin black finish, the two 10-inch towers strike an elegant profile, but can be easily toppled by accident, situated as they are on rather small bases. What's more, this vertical orientation has the unfortunate effect of projecting sound straight ahead toward your torso, rather than on an upward trajectory toward your ears like most speakers.

Aesthetics aside, the satellites deliver incredible fidelity. When we lowered our head into the sweet spot, we were rewarded with crisp highs, although when we listened to really high-pitch tones, we noted a slight muddiness. The dual-midrange drivers deliver superb midrange though, making the satellites the definite high-point of this speaker system.

The subwoofer is the system's low point (no pun intended). In fact, it's one of the most flaccid subs we've heard in awhile. At low volumes the output from the sub's 6.5-inch driver is barely perceptible, and at higher volumes the sub either bottoms out or belches because of its inability to move sufficient quantities of air. Also lacking is any semblance of upper bass response. Furthermore, we experienced an anomaly in testing: If we put the sub directly in the sweet spot it sounded decent, but once we moved it three feet away we could hardly tell it was even turned on. The sub's output, or the perception of its output, drops considerably the further away it's moved from the most acoustically ideal location.



We're having second thoughts about THX certification after reviewing the MX5021, as it's remarkably under-powered, yet still boasts Lucas' official stamp.

The crushing blow is that this is the most expensive 2.1 speaker rig on the market. It costs \$50 more than Logitech's Z-2200, which pumps out twice as much power and sounds better to boot. Even the \$130 Klipsch Promedia 2.1 offers a more robust overall sound. The Altec's satellites are nice, but as a whole this system is overpriced and under-powered.

—JOSH NOREM

MAXIMUM PC VERDICT 6

+ SPEAKERS

Decent satellites, nice look, includes a remote control and polishing cloth.

- TWEAKERS

Weak subwoofer, too-tall satellites, overpriced.

\$200, www.alteclansing.com

And Then There Were Four...

Two USB storage devices, a DVD copying app, and a gamepad that keeps you dry

Freecom USBCard

Sporting the physical dimensions of a credit card, the Freecom USBCard is billed as the "USB 2.0 storage device that fits in your wallet," a claim the manufacturer emphasizes by including a small leather wallet in the box. Talk about bundling! We put the USBCard to the test by packing it, some credit cards, and a driver's license into the included wallet. We shuttled this parcel around in our back pocket for a few days and found the USBCard does indeed live up to its portable billing. We were even able to transport the unit in our cram-packed everyday wallet with little complaint from our sensitive rump.

File transfers to and from the unit are fast and simple thanks to the USB 2.0 interface. Our only real complaint is the woefully short USB connector, which makes connecting the device to a rear USB port an awkward affair. Because many PCs these days have front-mounted USB ports (or USB hubs), we consider this a minor knock on what is an otherwise worthwhile product.

—TAE KIM

- **PORTABLE:** Slim design, great portability.
- **PORT-A-POTTY:** Short connector cable.

MAXIMUMPC VERDICT: 8

\$100 for 128MB; \$140 for 256MB; \$230 for 512MB, www.freecom.com



Lexar JumpDrive Traveler

A handy piece of preloaded software transforms this 128MB USB 2.0 key into something more powerful. With the click of a mouse, the *Traveler* application from which the JumpDrive gets its name lets you surf the web and conduct e-mail from any computer without leaving a single trace of your activities on the host system. It does this by redirecting all the associated files and data generated during your *Internet Explorer* and *Outlook Express* sessions to the USB drive itself.

The software comes with a variety of privacy settings and also makes syncing the data between the solid-state drive and your computer a simple task. Unfortunately, the convenient-sounding Auto Pop feature, which is supposed to automatically launch the unit's *Traveler* software whenever the drive is connected to an Internet-enabled computer, refused to work properly. Our only other beef with the software is its limited support—*Internet Explorer* and *Outlook Express* are its only allies.

Quibbles aside, the JumpDrive should appeal to anyone who frequents Internet cafés, shares a system with other people, or is just plain paranoid.

—TAE KIM

- **JUMPING JACK FLASH:** Provides solid privacy options.
- **IT'S A GAS, GAS, GAS:** Broken quick-launch feature, limited app support.

MAXIMUMPC VERDICT: 7

\$60, www.lexarmedia.com



ICopyDVDs2

If you insert a DVD movie for duping, *ICopyDVDs2* warns you that it can't duplicate protected content. Bummer. Read the company's warning further, though, and it asks if you'd "like more information about backing up CSS encrypted movies?" Clicking "yes" takes

you to the company's web site, which teaches you how to use Google to search for an application called *DVD43*, which strips away copy protection from a DVD in real-time. That's certainly one way to circumvent liability.

With *DVD43* installed, *ICopyDVDs2* works just like *DVDXCopy Xpress*, and lets you compress an entire movie onto a single disc and even throw away the DVD's extra features if you'd like. Unfortunately, just as with *DVDXCopy Xpress*, longer movies are prone to compression artifacts, though these glitches don't look too bad when viewed on a low-resolution TV. We were able to dupe a movie in less than an hour.

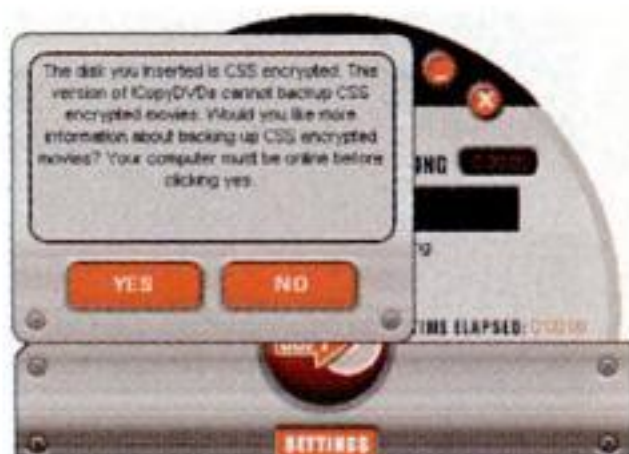
But then again, after a federal judge recently put the kibosh on *DVDXCopy*, *ICopyDVDs2* and software like it may be the only way for you to make archival backups of movies you actually own.

—GORDON MAH UNG

- **ARCHIVAL BACKUP:** Low-cost and easy to use.
- **SCRATCHED-UP ORIGINAL:** Doesn't work unless you download extra components from the Internet.

MAXIMUMPC VERDICT: 8

\$50, www.icopydvds2.com



Nyko AirFlo PC Gamepad

The AirFlo gamepad—like the AirFlo mouse we reviewed last month—aims to keep your palms cool and dry no matter how hard you game. But unlike the mouse, which received a 9 verdict, the gamepad fails to deliver on its promise.

The AirFlo includes all the necessary elements of a good gamepad—a pair of clickable analog sticks, an eight-way directional pad, seven buttons on the face, and four shoulder triggers. In addition to that it has a two-speed fan, which theoretically blows cool, refreshing air over your sweaty paws. Unfortunately, the pad's fan isn't powerful enough to effectively move air through our forceful clutches, despite the fact that the gamepad's fan is more powerful than that of the AirFlo mouse.

In fact, the pad's added fan strength is responsible for an audible high-pitched whine, even on the low setting.

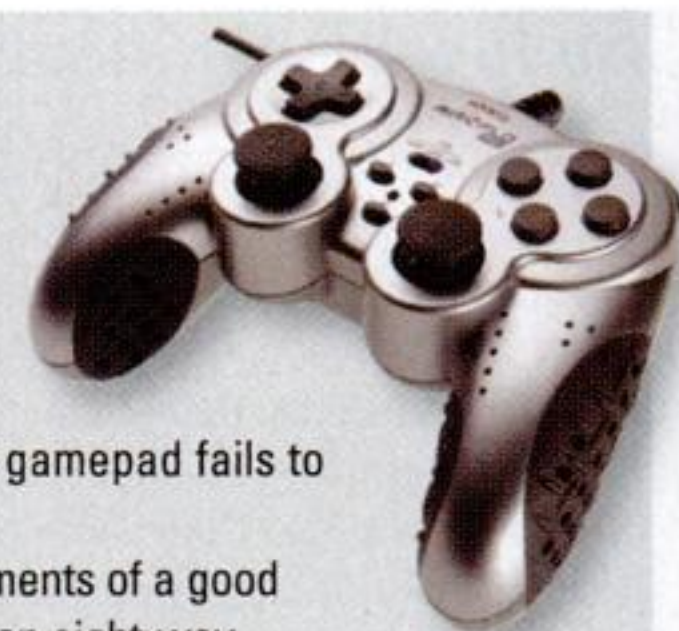
The AirFlo's response feels sluggish, and onscreen movement frequently lags behind the sticks' movements. Button placement is similarly sketchy. Furthermore, the three center buttons are almost impossible to hit without taking one hand entirely off the pad, and it's difficult to reach all four triggers.

—WILL SMITH

- **WINDFALLS:** The 10-foot cord is handy, and the price is right.
- **WINDBAGS:** AirFlo technology doesn't add much to this gamepad.

MAXIMUMPC VERDICT: 6

\$25, www.nyko.com



Syberia 2

A fantastic adventure in a mythical realm.
And penguins, too!

Every once and a while a charming and uninhibited caper like *Syberia 2* comes along and reminds us that, at their best, adventure games can be the interactive movie experience that other games claim to be but aren't.

In the original *Syberia*, lawyer Kate Walker gets sent by her firm to obtain a signature from Hans Voralberg, the sole heir of an automaton factory that's up for sale. Kate soon learns about Hans' obsessive quest to find a lost mammoth-worshiping civilization called Syberia, and despite her reasonable doubts about the man's sanity, she becomes determined to help him realize his dream. The more Kate helps Hans reach his destination, the more incredible places she travels to, and the further away she moves from a life that she begins to discover she never wanted in the first place.

Syberia 2 begins after Kate's climactic decision to abandon her career and accompany Hans in his pursuit of Syberia. To this end, Kate isn't above bribing children with candy, defacing monasteries, and even throwing an impromptu party in a cave with a shaman and some suspicious berries. Nor does she wither when confronted by extremely defensive Emperor penguins or a Cockney poacher menacing her with an ivory tusk. Atta girl!

Although her adventures take place entirely on a frozen, wintry continent, *Syberia 2* exudes warmth. Every prerendered screen sparkles with shimmering detail (including a startling sepia-toned memory sequence), and the nostalgic sound effects of creaky, delicate machinery are the most moving we've ever heard in an adventure game.

Syberia 2 suffers from too many puzzle sequences that feel like time-



Here's a typical example of *Syberia 2*'s intoxicating visuals. Even the menu screen stopped jaded editors in their tracks!

consuming filler. Additionally, "getting" the full emotional impact of the story requires that you play the original game first. But, like the magical realism of Latin American literature, *Syberia 2* balances itself beautifully on the precarious line between the credible and the incredible. It's impossible to complete the game without reflecting upon its theme: that our lives expand and contract in direct proportion to our courage, and that our courage is most tested by the pursuit of what seems an impossible goal.

—LOGAN DECKER

MAXIMUMPC VERDICT

7

+ SYBERIA

A deeply involving game with a fantastic story.

- DIPHTHERIA

Still, it's a conventional point-and-click game bogged down by frustrating pixel hunts and busywork.

\$30, www.syberia.com

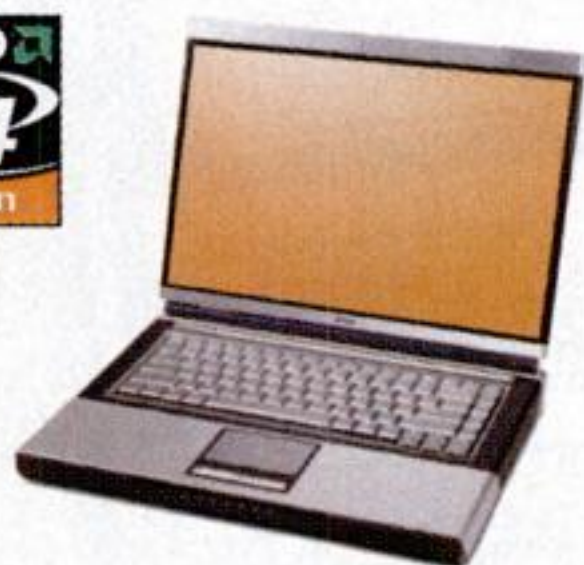
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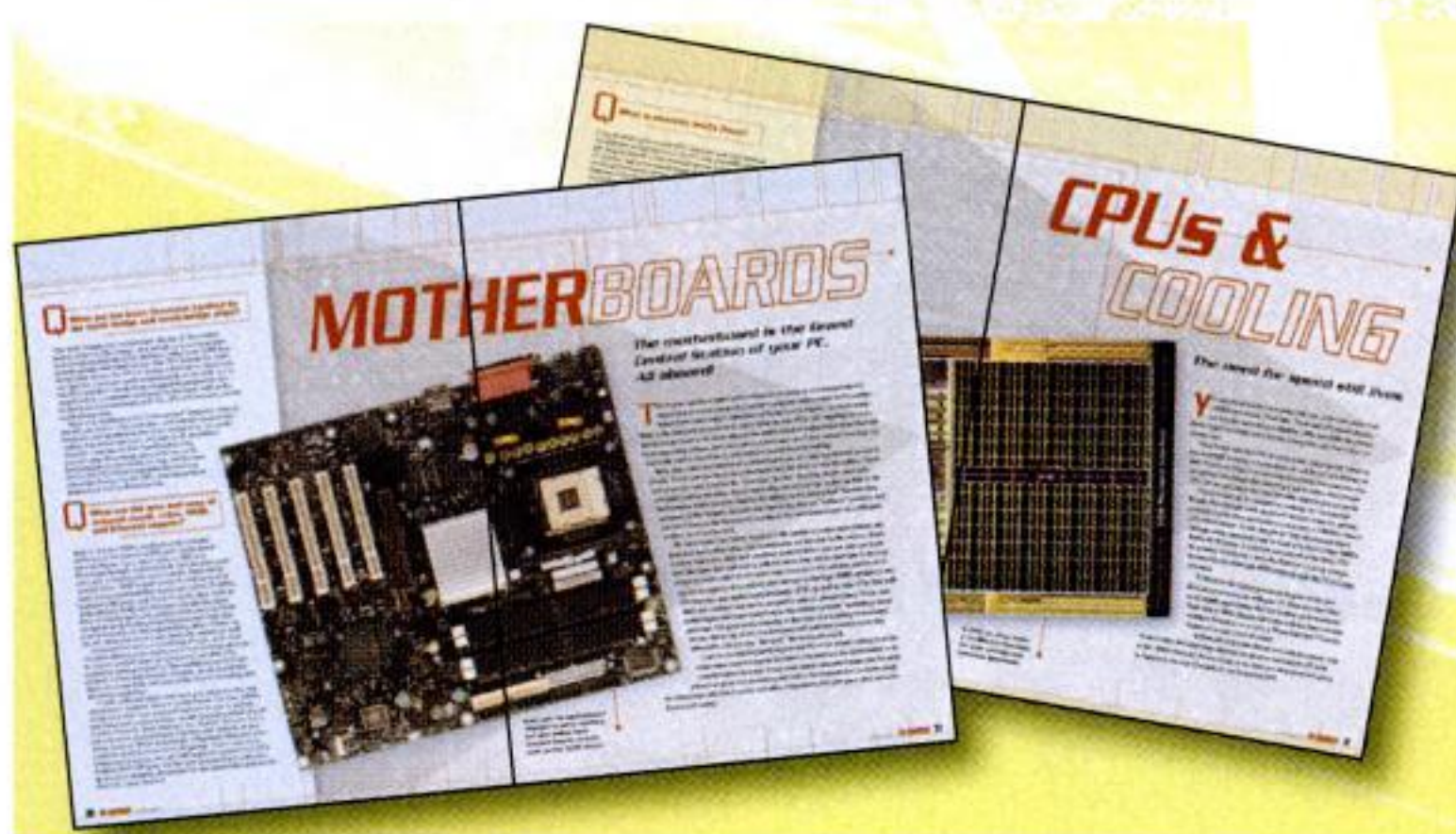
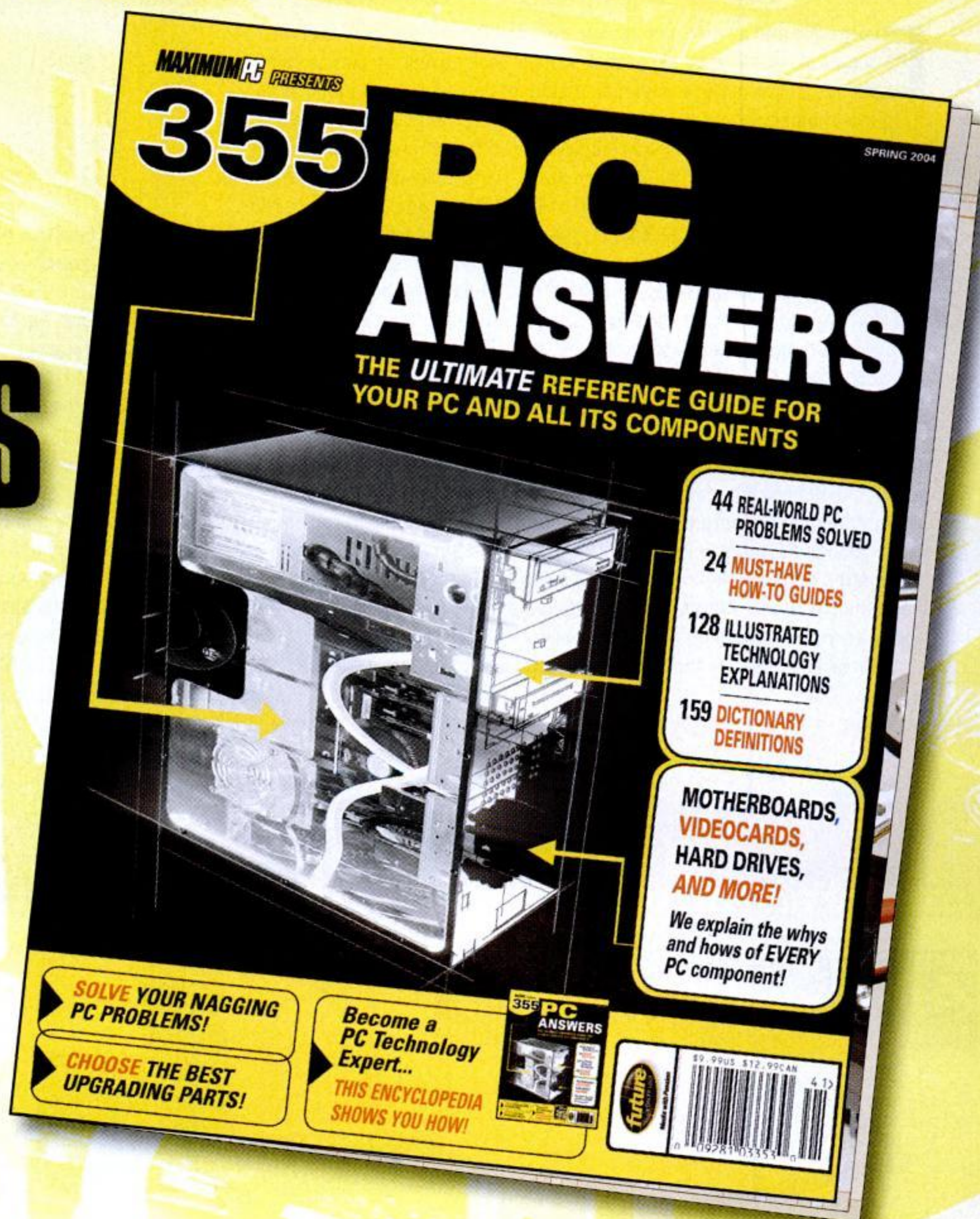
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EVGA - NVIDIA	
GeForce FX 5200 64MB	\$74
GeForce FX 5200 128MB	\$79
GeForce FX 5600 XT 256MB	\$126
GeForce FX 5900 SE 256MB	\$229
GeForce FX 5200	
Personal Cinema	\$168
MSI	
TV Anywhere Master	\$57
ATI - Built by ATI	
AIW 9800 PRO 128MB	\$369
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RADEON 9200 128MB	\$75
RADEON 9600 128MB	\$161
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RADEON 9800 256MB	\$455

CASES

TCW	
Midtower 350w	\$57
Enlight Mid 7237 USB	\$61
FullTower 300w	\$75
Aluminum w/Window	\$171
Blk Aluminum w/Window	\$171
ANTEC	
Sonata Piano Black	\$113
SX630II 300W Mini-Tower	\$77
SX1040BII 400W File Server	\$100
SLK3700AMB 350W	\$81
SLK2600AMB 300W	\$60
Overture Black/Silver	\$106
Super Lanboy	\$91
P160 Performance Case	\$127
CASE ACCESSORIES	
80MM fan guard	\$5
6pk Case thumbscrews	\$5

CD-RW

52x32x52 Lite-On BLK	\$43
52x32x52 Lite-On	\$42
52x32x52 MSI Retail	\$37
52x24x52 Samsung	\$40

MOTHERBOARDS

ATHLON 64	
MSI K8T NEO-FIS2R	\$131
ASUS K8V DELUXE	\$151
BIOSSTAR K8NHA PRO	\$109
ATHLON 64FX	
ASUS SK8N nFORCE3	\$192
ASUS SK8V VIA K8T800	\$224
ATHLON / DURON	
BIOSSTAR	
M7VIK KT400	\$76
M7NCD PRO NVIDIA nForce2	\$72
M7NCG PRO NVIDIA nForce2	\$87
MYVIZ KM400	\$59
M7VIGPRO-D KM266	\$52
M7NCD NVIDIA nForce2	\$59
MICROSTAR	
KM2M COMBO-L SDRAM/DDR	\$59
MSI KT4AV-L KT400	\$65
K7N2-DELTA-ILSR	
NVIDIA nForce2	\$123
KM4M-L VIA KM400	\$65
K7N2GM-L nFORCE2	\$93
ASUS	
A7V8X-X KT400	\$69
A7N8X-E DLX nFORCE2	\$125
MICROSTAR DUAL SKCTA	
K7D MASTER-L A760MPX	\$204
PENTIUM4 / CELERON	
ASUS	
P4C800DX 1875P	\$178
P4P800-DX 1865P	\$134
INTEL	
D865 PERLK 1865PE	\$133
D865GBFL 1865G	\$111
D875PBZLK 1875P	\$153
D865GLCL 1865G	\$110
MSI	
845PE MAX-L 1845PE	\$70
865PE NEO2-FIS2R	\$150
865PE NEO2-LS	\$99
848P NEO-LS 1848P	\$78
865GM2-L 1865G	\$95
BIOSSTAR	
U8668-D XVIA P4M266A	\$49

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- 256 Mb DDR PC2100 266Mhz Memory
- 80Gb 7200RPM HardDrive
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- 5.1 Channel Audio with 120 watt Speakers
- 10/100 LAN
- 52x32x52 CDRW
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- Blue Cold Cathode lighting
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- 10/100 LAN & 56K Modem
- 52x32x52 CDRW
- 1.44 mb 3.5" Floppy Drive
- Windows XP Home -Keyboard & Mouse
- Cold Cathode lighting
- Black Keyboard & Mouse
- Free Toll Free Lifetime Tech Support
- Built by HDC Certified Techs
- Full Manufacturer Warranties

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Cases Step 1

All Combos Below Include Case, Power Supply, Keyboard, Mouse, and Speakers



Motherboards Step 2

Asus	P4P8XSE	\$180	P4P800 Deluxe	\$133
	P4C800 Deluxe	\$180	P4C800E Deluxe	\$200
Gigabyte	GA8IG1000Pro	\$112	GA8KNXP	\$215
Intel	D875PBZLK	\$169	D865PERLX	\$110
DFI	PRO875B	\$191	865PE	\$143
MSI	MS6728030	\$147	865GNEO2-PLS	\$102
Soyo	P4I875PLAT	\$181	DRAGON2V1	\$192
Abit	IC7-MAX3	\$197	AI7	\$118
Asus	A7N8X	\$93	A7V8XX	\$67
	A7V8XXM	\$65	A7N8XE Deluxe	\$123
Gigabyte	GA7NNXP	\$159	GA7VT600L	\$69
MSI	K7N2DILSR	\$122	KT6VLSR	\$63
Soyo	K7VMP2	\$57	KT600DUPLAT	\$136
Abit	KV7	\$75	NF7M	\$105
DFI	KT400A LanParty	\$128	NFIULTRA LanParty	\$156

Processors Step 3

Celeron	2.4 GHz 400Mhz	\$83	P4	2.8GHz 512k 800	\$202
Celeron	2.5 GHz 400Mhz	\$94	P4	3.06GHz 512k 533	\$292
Celeron	2.6 GHz 400Mhz	\$102	P4	3.0GHz 512k 800	\$247
Celeron	2.7 GHz 400Mhz	\$115	P4	3.2GHz 512k 800	\$311
P4	2.4GHz 512k 533	\$184	P4	2.8GHz 1Mb 800	\$202
P4	2.4GHz 512k 800	\$179	P4	3.0GHz 1Mb 800	\$247
P4	2.66GHz 512k 533	\$182	P4	3.2GHz 1Mb 800	\$311
P4	2.6GHz 512k 800	\$199	P4Extreme3	3.2GHz 2Mb L3 800	\$999
P4	2.8GHz 512k 533	\$220	P4Extreme3	3.4GHz 2Mb L3 800	\$1099
XP	2000+ Retail 266Mhz	\$78	XP	3200+ Retail 400Mhz	\$232
XP	2200+ Retail 266Mhz	\$83	Opteron	244 1800Mhz	\$497
XP	2400+ Retail 266Mhz	\$92	Opteron	246 2000Mhz	\$853
XP	2500+ Retail 333Mhz	\$100	Opteron	248 2800Mhz	\$979
XP	2600+ Retail 333Mhz	\$112	Athlon64	3000+ 1600Mhz	\$257
XP	2700+ Retail 333Mhz	\$132	Athlon64	3200+ 1600Mhz	\$330
XP	2800+ Retail 333Mhz	\$156	Athlon64	3400+ 1600Mhz	\$479
XP	3000+ Retail 333Mhz	\$221	Athlon64	FX-51	\$858

Memory Step 4

SDRAM			
All Components	PC133512MB 32X8 133MHz		\$89
DDR Memory			
Crucial	PC2100 128MB DDR266	CT1664Z265	\$34
Crucial	PC2100 256MB DDR266	CT3264Z265	\$51
Crucial	PC2100 512MB DDR266	CT6464Z265	\$82
Crucial	PC2700 128MB DDR333	CT1664Z335	\$35
Crucial	PC2700 256MB DDR333	CT3264Z335	\$51
Crucial	PC2700 512MB DDR333	CT6464Z335	\$87
Crucial	PC3200 256MB DDR400	CT3264Z403	\$60
Crucial	PC3200 512MB DDR400	CT6464Z408	\$96
Crucial	PC3200 1GB DDR400	CT12872Y408	\$264
Crucial	PC3200 2GB DDR400	CT25672Y408	\$1072

HardDrives Step 5

Maxtor	80GB	7200rpm	ATA 133	6Y080L0	\$75
Maxtor	120GB	7200rpm	ATA 133	6Y120P0	\$106
Maxtor	160GB	7200rpm	ATA 133	6Y160P0	\$124
Maxtor	160GB	7200rpm	SATA	6Y160MO	\$145
Maxtor	250GB	5400rpm	ATA 133	5A250J0	\$226
Seagate	80GB	7200rpm	ATA 133	ST380011A	\$79
Seagate	120GB	7200rpm	ATA 133	ST3120026A	\$103
Seagate	80GB	7200rpm	SATA	ST380013AS	\$88
Seagate	120GB	7200rpm	SATA	ST3120026AS	\$113
Seagate	160GB	7200rpm	SATA	ST3160023AS	\$138
WD	80GB	7200rpm	ATA100	WD800JB	\$83
WD	120GB	7200rpm	ATA100	WD1200JB	\$102
WD	200GB	7200rpm	ATA100	WD2000JB	\$170
WD	36GB	10000rpm	SATA	WD360GD	\$132
WD	74GB	10000rpm	SATA	WD740GD	\$270
IBM	80GB	7200rpm	SATA	13G0252	\$88
IBM	160GB	7200rpm	SATA	13G0254	\$145
IBM	250GB	7200rpm	SATA	13G0255	\$295

Video Cards Step 6

EVGA	256A8N311AX	GEFORCE FX 5600 256MB Personal Cinema	\$210
EVGA	128A8N336AX	GEFORCE FX 5700 Ultra 128MB DDR	\$179
EVGA	256A8N317TX	GEFORCE FX 5600 XT 256MB DDR TV/DVI	\$120
EVGA	256A8N338AX	GEFORCE FX 5950 256 MB DDR VIVO	\$459
Asus	V7100PRO64	GEFORCE 2 MX400 64MB	\$39
Asus	V9570/TD/256M	GEFORCE FX 5700 256MB VIVO/DVI	\$185
Asus	V9980ULTRA	GEFORCE FX 5950 256MB DDR VIVO/DVI	\$434
Asus	R9600SE/TD	Radeon 9600 SE/TD 128MB w/ TV/DVI	\$85
Asus	R9600XT/TVD	Radeon 9600 XT/TVD 128MB 8x AGP	\$197
Asus	R9800XT/TVD	Radeon 9800 XT/TVD 256MB 8x AGP	\$485
ATI	100437009	Radeon 9600 SE 128MB DDR TV-Out	\$120
ATI	100437100	Radeon 9600 XT 128MB DDR VI/DVI	\$182
ATI	100435100	Radeon 9800 XT 128MB DDR 8x AGP	\$489
ATI	100714120	Radeon AIW Radeon 9600Pro 128MB DDR	\$186
Matrox	G55MDHA32DR	G550 32MB DDR Dual Head	\$110
Matrox	G2QUADPP17	G200 32MB Quad Display	\$519

Sound Cards Step 7

Creative Labs Audigy 2 Platinum is also available in Black, Silver, Blue, Yellow & Green		
Audigy 2 Platinum Black Bezel \$19		
Turtle Beach	512 Voice Sound Card	\$76
Turtle Beach	Audiotron 100 Dig Player	\$213
Creative Labs	Sound Blaster PCI128	\$21
Creative Labs	Sound Blaster Live! 5.1	\$52
Creative Labs	Audigy 2 ZS	\$95
Creative Labs	Audigy 2 ZS Platinum	\$176
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CD-R/RW/DVD/DVD-RW & Floppy Drives Step 8

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52x32x52	USB	Plextor PREMIUM USB 2.0	\$149	Silver
52x32x52	IDE	Plextor PXPremium	\$97	\$112
52x24x48	IDE	TDK AI-5200	\$82	\$97
52x24x52	IDE	Samsung SW252FRNS	\$45	\$60
52x24x52	IDE	Lite-On LTR52327S	\$42	\$57
52x32x52	IDE	BenQ 5234W	\$47	\$62
52x32x52	IDE	Lite-On USB2 LTR523275X	\$76	Black
52x24x52	IDE	Pacific Digital Blue Lightning	\$59	Clear
52x32x52	IDE	Sony CRX230AU	\$69	\$84
52x32x52	IDE	Samsung SM352BRNS	\$63	\$78
52x32x52	IDE	Teac CDW552GKIT	\$52	\$67
52x24x52	IDE	MSI CR52M	\$46	\$61

DVD Drives				Beige	Color
Sony	DDU1621	16x/48x	IDE	\$44	\$59
PDC	Blue Lighting	16x/40x	IDE	\$56	Clear
Pioneer	DVD120	16x/40x	IDE	\$47	\$62
Samsung	SD816BRPS	16x/48x/16x/48x	IDE	\$45	\$60
Pioneer	DVD305S	10x/40x	SCSI	\$110	\$125
CD-ROM Drives					
Lite-On	LTN526	52x	IDE	\$30	\$45
Creative Labs	BLASTER52X	52x	IDE	\$32	\$47
BenQ	CD656A	56x	IDE	\$29	\$44
DVD-RW Drives					
Sony	DRU530A	8X DVD Recorder		\$162	\$177
Creative	8XDVR	8X DVD Recorder		\$161	\$176
Lite-On	LDW451S	4X DVD Recorder		\$102	\$117
Floppy Drives					
Mitsumi	IDE	1.44MB D359M3		\$13	\$17
Sony	IDE	1.44MB MPF920		\$13	\$21

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Memory	256MB DDR PC3200 400MHz Memory
Hard Drive	80GB 7200 RPM Ultra ATA/100 Hard Drive
Video	Intel® Extreme Graphics 2
Audio	SoundMAX 4 XL with AudioESP audio subsystem
Modem	Creative Labs 56k V.92 PCI Modem & 10/100/1000 Gigabit
CDRW	52x32x52 IDE Internal CD-RW w/HDC Black Bezel
DVD	16x DVD Player with Black Bezel
Floppy	Mitsumi 1.44 3.5" Internal Floppy
Speakers	120 Watts - 2-Channel Stereo Amplifier
Keyboard	Windows 98/ME/2000/NT/XP & PS/2 & USB Fully Compatible
Mouse	400CPI sensitive 2 Button Scrollable
Operating Sys	Microsoft Windows XP Home Edition CD Version OEM
Case Mods	12" Blue Cold Cathode light kit
Labor	Labor, Building, Loading O.S., Testing

add 17" Samsung 750S Black CRT Monitor \$126

Case	Black Gamerbox Combo with 400watt Power Supply
Motherboard	Intel® 865PERLX P4 800MHz SATA AGP8X ATX
CPU	Intel® Pentium® 4 2.8GHz with Hyper Threading Technology
Memory	512MB DDR PC3200 400MHz Memory
Hard Drive	120GB Serial ATA 7200RPM 8Mb Hard Drive
Video	GeForce FX5600XT 256MB DDR
Audio	6-channel audio Onboard
Modem	Creative Labs 56k V.92 PCI Modem & 10/100 Ethernet
CDRW	52x32x52 IDE Internal CD-RW w/HDC Black Bezel
DVD	16x DVD Player with Black Bezel
Floppy	Mitsumi 1.44 3.5" Internal Floppy
Speakers	120 Watts - 2-Channel Stereo Amplifier
Keyboard	Windows 98/ME/2000/NT/XP & PS/2 & USB Fully Compatible
Mouse	400CPI sensitive 2 Button Scrollable
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Case	Black Gamerbox Combo with 400watt Power Supply
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CPU	Intel® Pentium® 4 3.0GHz with Hyper Threading Technology
Memory	512MB DDR PC3200 400MHz Memory CL25
Hard Drive	120GB Serial ATA 7200RPM 8Mb Hard Drive
Video	GeForce FX 5950 Ultra 256MB VIVO Video Card
Audio	Creative Labs Audigy2 ZS Surround Sound Card
Modem	Creative Labs 56k V.92 PCI Modem & 10/100 Ethernet
CDRW	52x32x52 IDE Internal CD-RW w/HDC Black Bezel
DVD	16x DVD Player with Black Bezel
Floppy	Mitsumi 1.44 3.5" Internal Floppy
Speakers	120 Watts - 2-Channel Stereo Amplifier
Keyboard	Windows 98/ME/2000/NT/XP & PS/2 & USB Fully Compatible
Mouse	400CPI sensitive 2 Button Scrollable
Operating Sys	Microsoft Windows XP Home Edition CD Version OEM
Case Mods	12" Blue Cold Cathode light kit
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AMD Athlon™ XP Processor 2500+	\$ 709	CBE506



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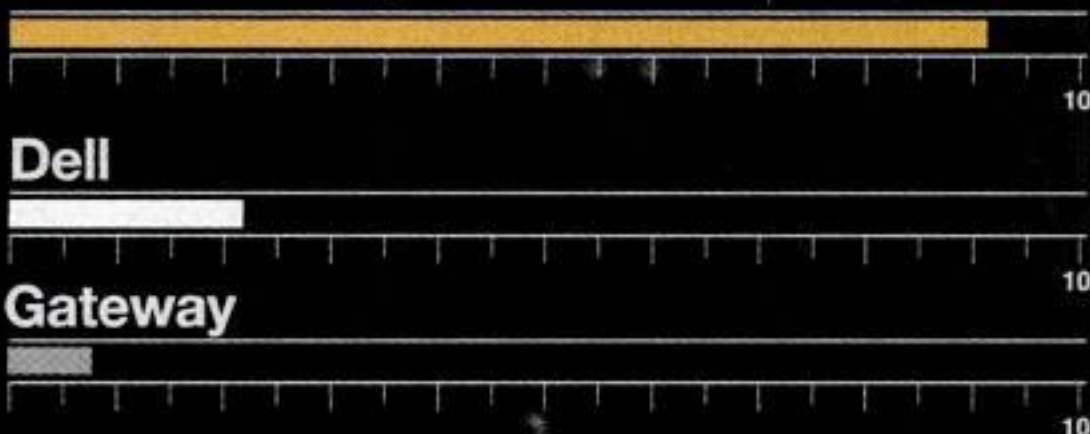
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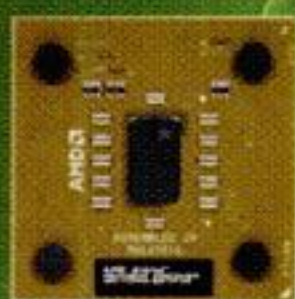
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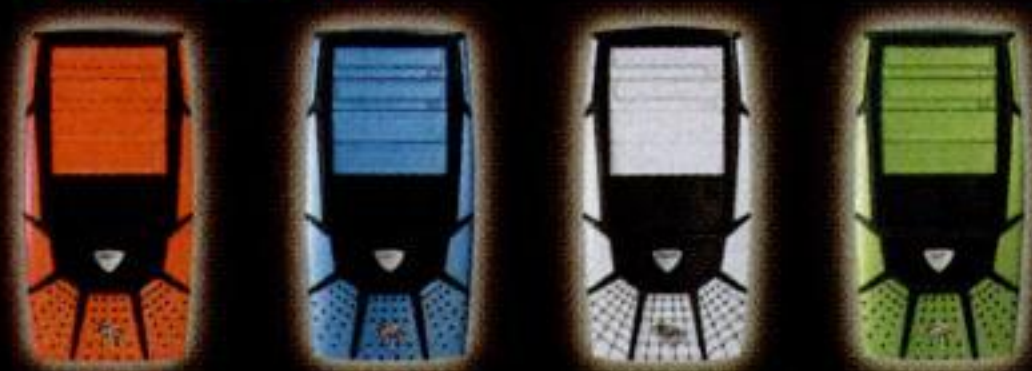
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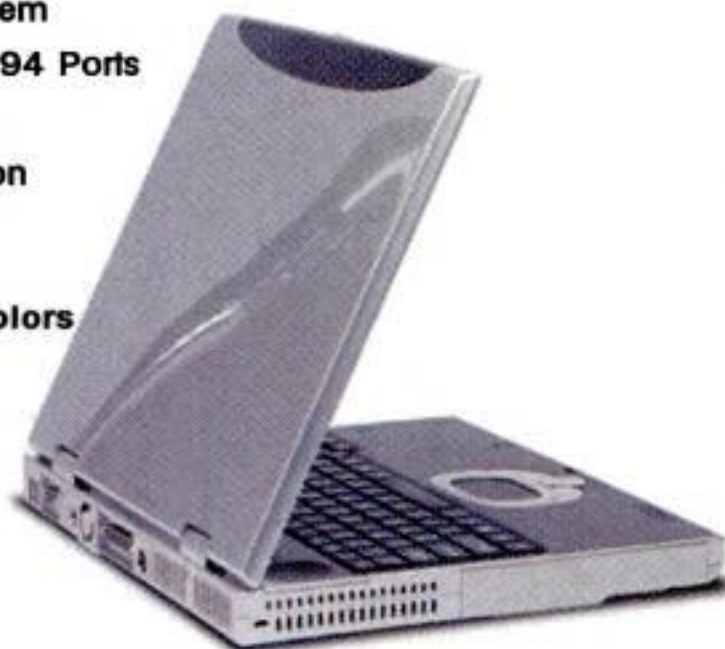
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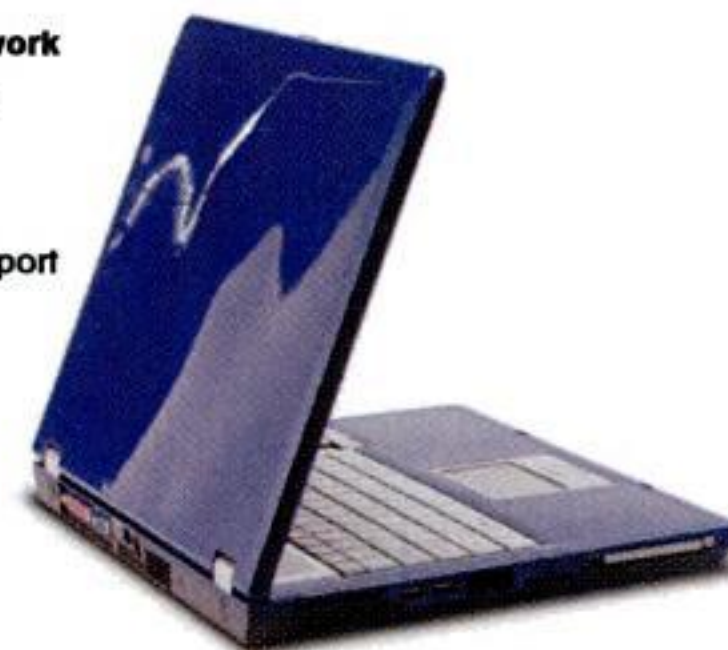
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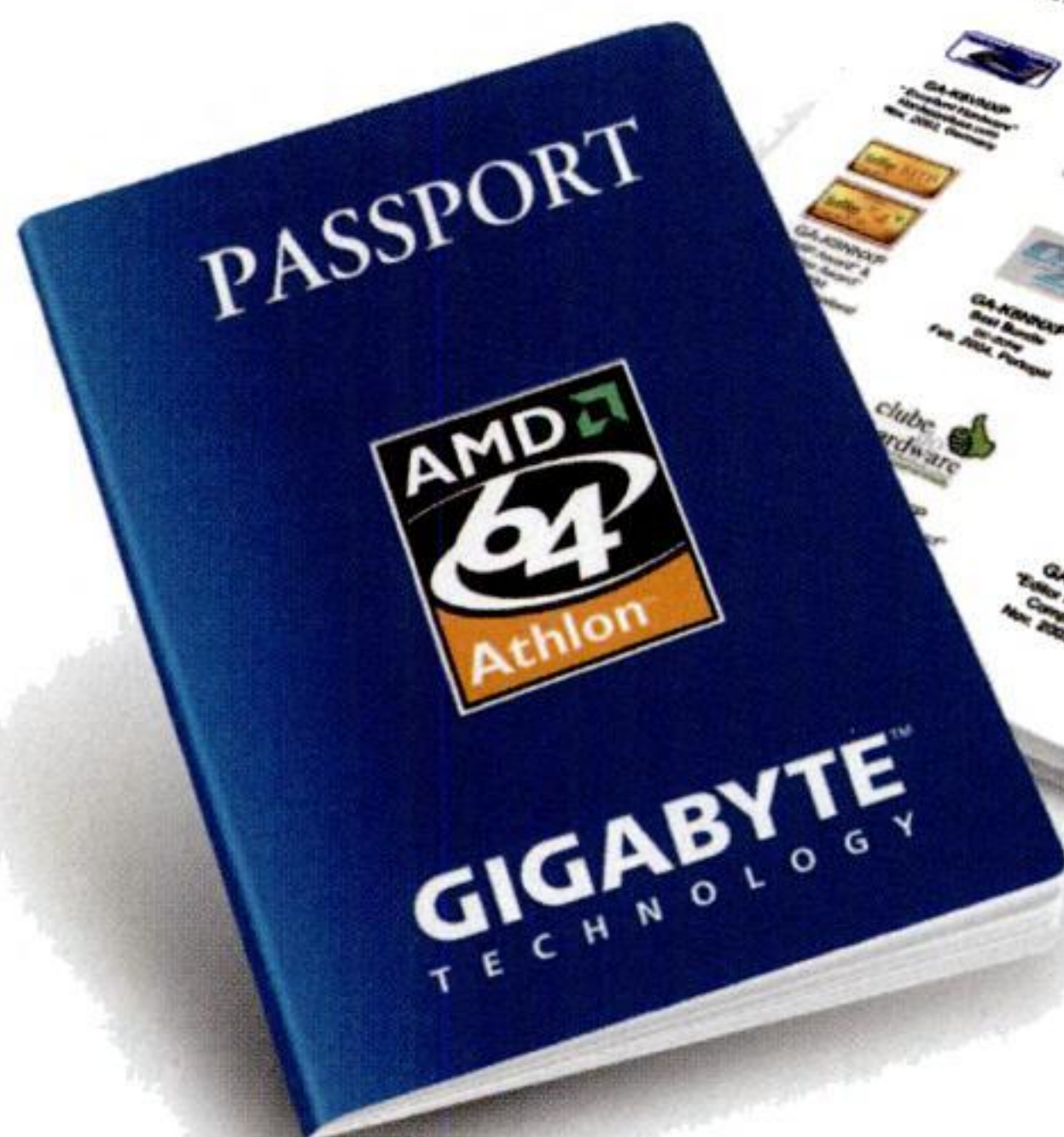


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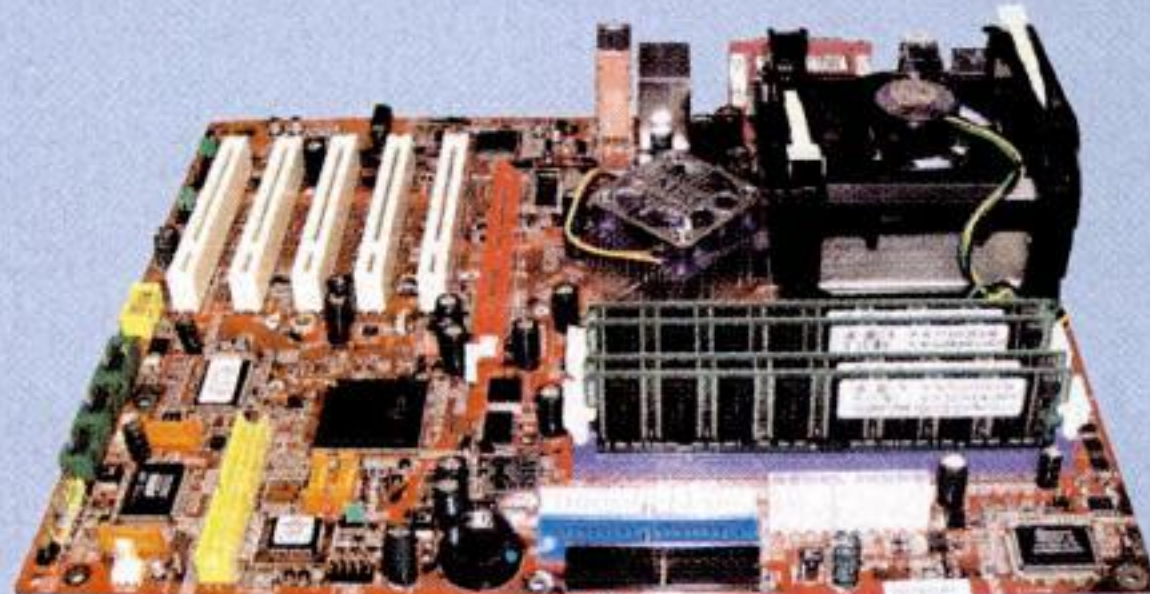
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WIN Rig of the Month and Win Big!

If your modded PC is chosen as a Rig of the Month, it will (1) be featured before all the world in *Maximum PC*, and (2) win you \$1,000 and a case of BAWLS high-caffeine soft drink. So what's stopping you?

TO ENTER: Your submission packet must contain your name, street address, and daytime phone number; no fewer than three high-res JPEGs (minimum size 1024x768) of your modified PC; and a 300-word description of what your PC represents and how it was modified. E-mailed submissions should be sent to rig@maximumpc.com. Snail mail submissions should be sent to Rig of the Month, c/o Maximum PC, 150 North Hill Drive, Suite 40, Brisbane, CA, 94005.

The judges will be *Maximum PC* editors, and they will base their decision on the following criteria: creativity and craftsmanship.

ONE ENTRY PER HOUSEHOLD. Your contest entry will be valid until (1) six months after its submission or (2) May 1, 2004, whichever date is earlier. Each month a winner will be chosen from the existing pool of valid entries, and featured in the Rig of the Month department of the magazine. The final winner in this contest will be announced in the July 2004 issue. Each of the judging criteria (creativity and craftsmanship) will be weighed equally at 50 percent. By entering this contest you agree that Future Network USA, Inc. may use your name, likeness, and web site for promotional purposes without further payment. All prizes will be awarded and no minimum number of entries is required. Prizes won by minors will be awarded to their parents or legal guardians. Future Network USA is not responsible for damages or expenses that the winners might incur as a result of the Contest or the receipt of a prize, and winners are responsible for income taxes based on the value of the prize received. A list of winners may also be obtained by sending a stamped, self-addressed envelope to Future Network USA, Inc., c/o Rig of the Month, 150 North Hill Drive, Brisbane, CA 94005. This contest is limited to residents of the United States. No purchase necessary; void in Arizona, Maryland, Vermont, Puerto Rico, and where prohibited by law.

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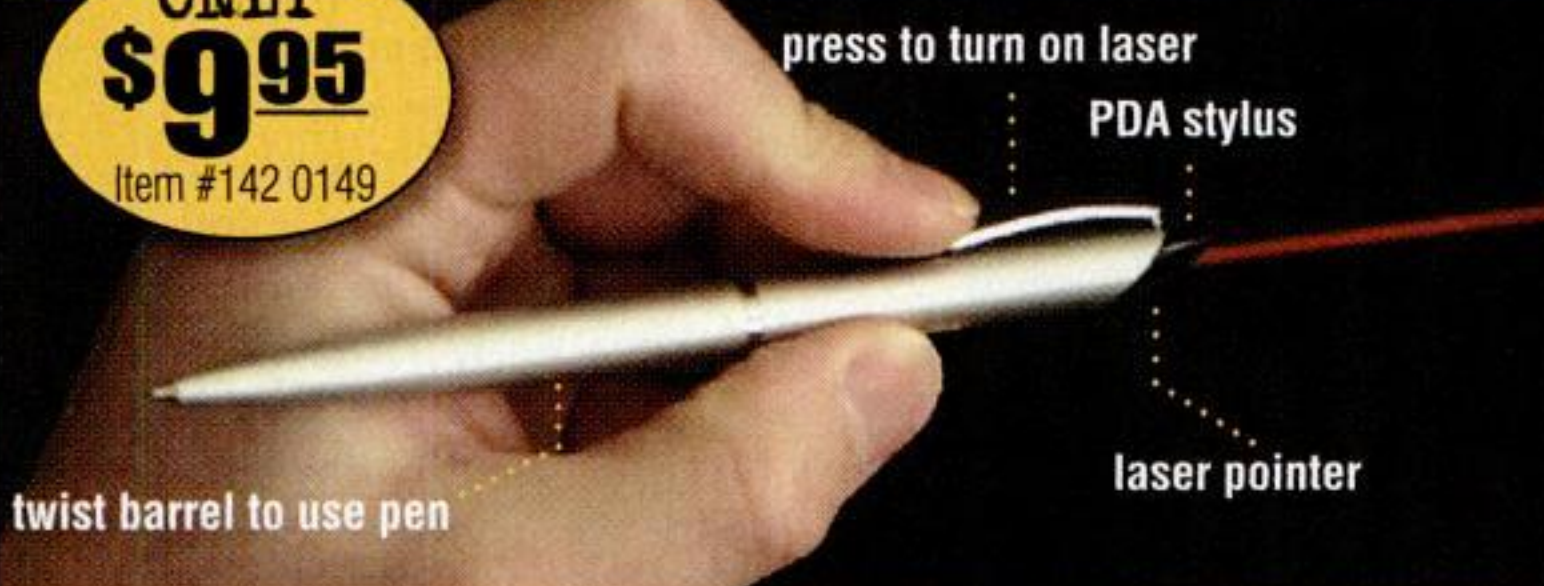
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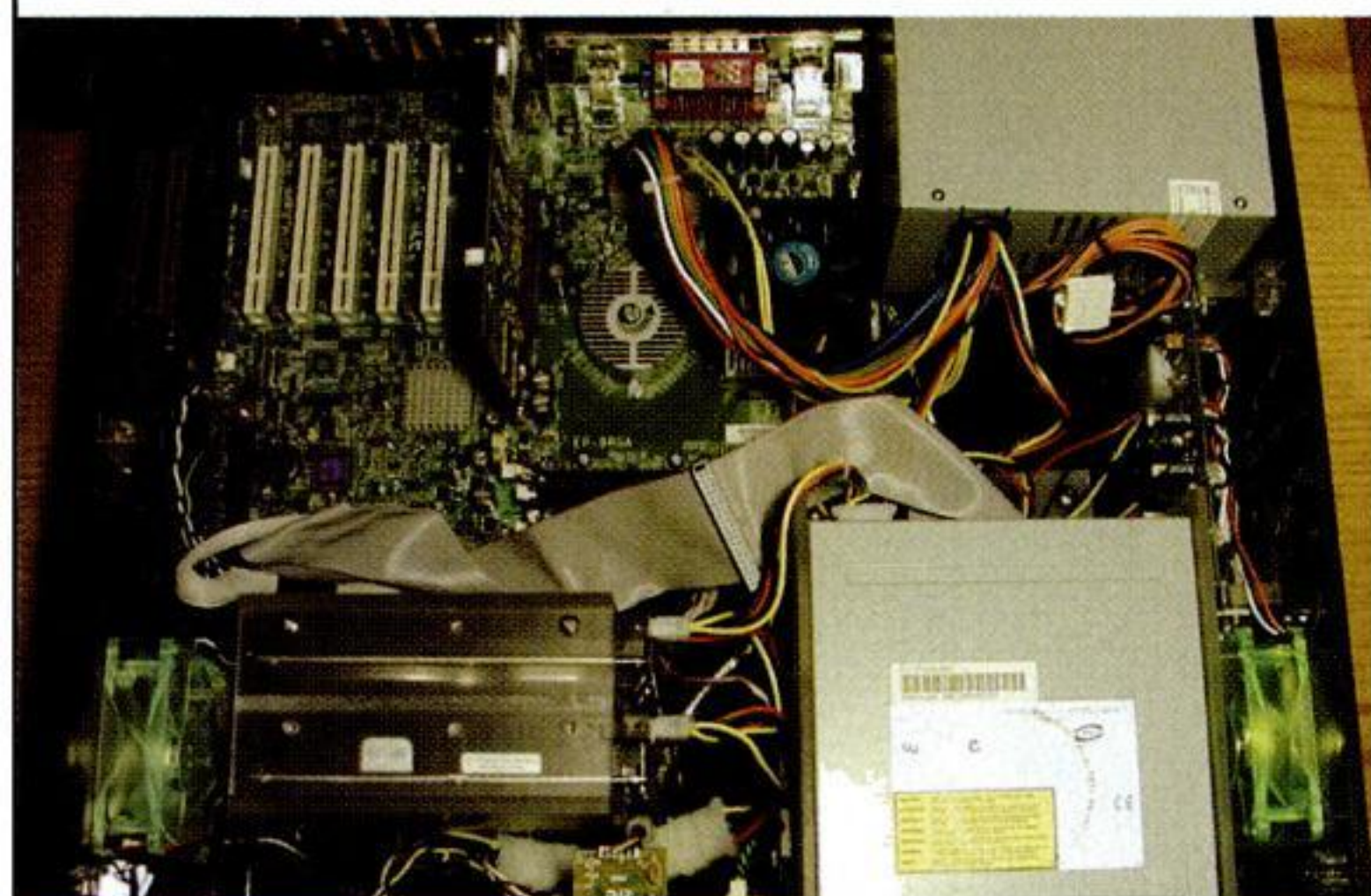
Mod. Overclock. Never Sleep!



We've seen PCs stuffed into all manner of foreign objects—various model cars, a golf bag, a wheel rim, a child-size coffin, you name it. What we like so much about this month's mod is the elegant utility of its disguise.

Not only do the size, shape, and look of the receiver make it suitable (and space efficient!) company for attendant electronic gear, but the audio classic's interface perfectly lends itself to PC operation. The far-left knob has been fashioned into a reset button, while the other four serve as fully functional fan controllers, and the receiver's original VU meter has been wired to display primary hard drive activity. The AM/FM readings don't serve any practical purpose, but the two LEDs Wiley

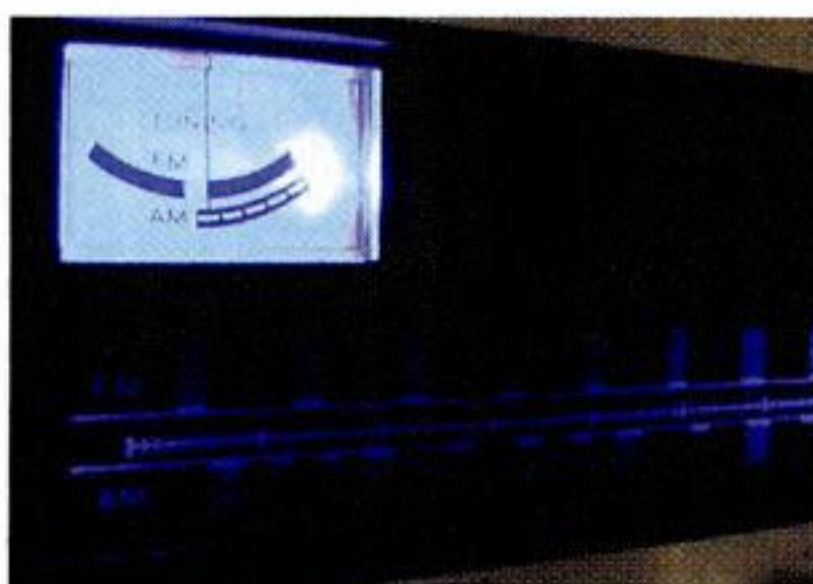
THIS MONTH: Alex Wiley's Marantz 2220B Receiver PC



The refurbished box is only slightly larger than the original, measuring 17 x 18 x 6-inches. Still, Wiley managed to fit in four hard drives (two of which are situated beneath the DVD burner).



To make the logo, Wiley cut a 1/8-inch relief of the design into the acrylic, filled it with silver-tinted epoxy, then sanded and buffed for a flush surface.



Perhaps you've seen some of Wiley's earlier work. His Spider PC recently made the rounds of enthusiast web sites and magazines, including *Maximum PC*. To see some of his other projects, go to www.computer-choppers.com.

installed behind the display pay homage to the receiver's "blue-face" series' lineage and make the whole shebang look groovy. Obviously the DVD burner and USB ports are modern-day conveniences that Wiley added.

The faceplate is actually the only original piece remaining of the Marantz 2220B receiver Alex Wiley bought on eBay. At the start of the project, he dispensed with the 1970s-era "wood" casing (and who can blame him?). In its place: a 1/4-inch acrylic shell with hand-cut fan grills and aluminum inlay in the sides, and a custom logo up top.

For his winning entry Alex Wiley wins **\$1,000** and a 12-pack of BAWLS to fuel his late nights of modding. You can win too! See previous page for contest details.



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- Vivendi Universal Games

Chris Mahnken,
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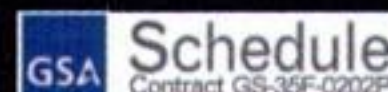
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